6398

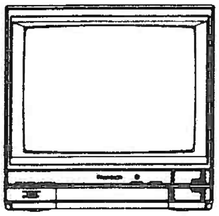
ORDER NO. MTC9311549F1
D6

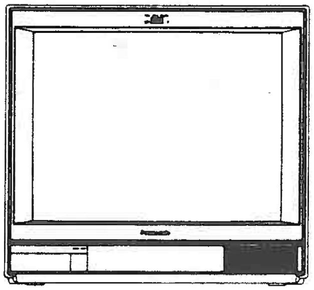
Service Manual

Color Monitor/Receiver

Model	Chassis
CT–1384VY	ANDP223
CT–2084VY	ANDP229
CT–2084VYA	ANDP229

Main Manual
(NA3A)


CT–1384VY


CT–2084VY/VYA

The service technician is required to read and follow the “Safety Precautions” and “Important Safety Notice” in this manual.

Specifications (Common)

Power Source:	120 volts, 60 Hz, AC
Power Consumption:	(See Chart)
Channel Capability:	181 Channel (Phase 18 Synthesizer)
Off the Air:	VHF 2~13, UHF 14~69
Cable:	125 Channels
Video Input Jacks:	(3) 1V p–p 75 ohm, BNC connector
Audio Input Jacks:	(3) 500mV rms, RCA connector
S–Video Input Jack:	(1) S–Video (Y–C) connector
Video Monitor Output Jack:	BNC connector
Audio Monitor Output Jack:	RCA connector
Video Throughout Jacks:	(3) BNC connector
Audio Throughout Jacks:	(3) RCA connector
S–Video Throughout Jack:	(1) S–Video (Y–C) connector
Earphone Jack:	1/8” mini plug type (13” model Only)
Comb Filter:	Separates video from chroma
Closed Caption:	Visual depiction of information contained in the audio portion of a television program.
Remote Control:	Infra–red system EUR501050
Picture Tube:	See Chart Below
Anode Voltage:	See Chart Below
Dimensions:	See Chart Below
Weight:	See Chart Below

Specifications (Unique)

Model(s) **Specifications**	CT–1384VY	CT–2084VY CT–2084VYA
Power Consumption	1 amp max.	1.6 amps max.
Picture Tube	13” diagonal 90 degree deflection 37GDA85X (M)	20” diagonal 90 degree deflection A51JXS61X
High Voltage	24.5kV max. (zero beam) 23.25kV ±1.25kV	30kV max (zero beam) 28.75kV ±1.25kV
Dimensions: **Height** **Width** **Depth**	 13–15/32” (342mm) 13–5/8” (346mm) 14–9/16” (370mm)	 18–5/32” (461mm) 20–15/64” (514mm) 19–15/64” (489mm)
Weight	23 lbs. (10.4kg)	49.5 lbs. (22.5kg)

Specifications are subject to change without notice or obligation. Dimensions and weight are approximate measurements.

Panasonic®

Panasonic Company
Division of Matsushita Electric
Corporation of America
One Panasonic Way
Secaucus, New Jersey 07094

Matsushita Electric
of Canada Limited
5770 Ambler Drive
Mississauga, Ontario L4W 2T3

Panasonic Company (West)
of America
Division of Matsushita Electric
Corporation of America
6550 Katella Ave.
Cypress, CA 90630

Panasonic Sales Company
Division of Matsushita Electric
of Puerto Rico, Inc.
Ave. 65 De Infanteria, KM 9.7
Victoria Industrial Park
Carolina, Puerto Rico 00630

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Important Safety Notice

There are special components used in this television set which are important for safety. These parts are BOXED on the schematic diagram and printed in **BOLD TYPE** on the replacement parts list. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent X–RADIATION, shock, fire or other hazards. Do not modify the original design without the permission of manufacturer.

Safety Precautions

General Guidelines

An ISOLATION TRANSFORMER should always be used during the servicing of a receiver whose chassis is not isolated from the AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injury from electrical shocks. It will also protect the receiver and its components from being damaged by accidental shorts of the circuitry that may be inadvertently introduced during the service operation.

When servicing observe the original lead dress, especially in the high voltage circuit. In case of a short circuit, replace every part which has overheated.

Always REPLACE PROTECTIVE DEVICES, such as fishpaper, isolation resistors and capacitors and shields after working on the receiver. Use only manufacturers recommended rating for fuses, circuit breakers, etc.

High potentials are present when this set is operating. Operation of the set without the rear cover involves the danger of electric shock from the set's power supply. Servicing should not be attempted by anyone who is not thoroughly familiar with the precautions necessary when working on high–voltage equipment.

Extreme care should be used in HANDLING THE PICTURE TUBE. Rough handling may cause it to implode due to atmospheric pressure (14.7 lbs per sq. in.). Do not nick or scratch the glass or subject it to any undue pressure in removal or installation. When handling, use safety goggles and heavy gloves for protection. Discharge picture tube by shorting the anode connection to chassis ground (not cabinet or other mounting parts). When discharging, go from ground to anode with a well insulated piece of wire.

Avoid prolonged exposure at close range to unshielded areas of the picture tube. Possible danger of personal injury from unnecessary exposure to X–ray radiation may result.

The TEST PICTURE TUBE used for servicing the chassis at the bench should incorporate a safety glass and magnetic shield. The safety glass affords shielding from the tube viewing area against X–ray radiation as well as implosion protection. The magnetic shield limits X–ray radiation around the bell of the picture tube in addition to restricting magnetic effects. When using a picture tube test jig for service, ensure that jig is capable of handling 31kV without causing X–radiation.

BEFORE RETURNING A SERVICED RECEIVER **(of any type)** TO THE OWNER, the service technician must thoroughly test the unit to be certain that it is completely safe to operate without danger of electrical shock. DO NOT USE A LINE ISOLATION TRANSFORMER WHEN MAKING THIS TEST.

Leakage Current Cold Check

Unplug the AC cord and connect a jumper between the two plug prongs.

Measure the resistance between the jumpered AC plug and each exposed metallic part such as screwheads, antenna terminals, control shafts, etc. If the exposed metallic part has a return path to the chassis, the reading should be between 240kΩ and 5.2MΩ. When the exposed metal does not have a return path to the chassis, the reading must be infinite.

Leakage Current Hot Check (See Figure)

Plug the AC cord directly into the AC outlet. Do not use an isolation transformer during the check.

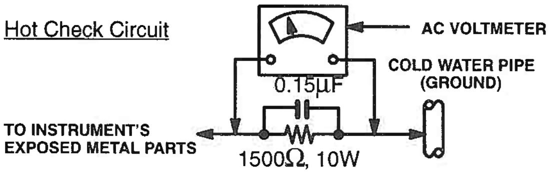
Connect a 1.5kΩ 10 watt resistor in parallel with a 0.15µF capacitor between each exposed metallic part and ground. Use an earth ground, for example a water pipe.

Using an AC voltmeter with 1000 ohms/volt or more sensitivity, measure the potential across the resistor.

Move the resistor connection to each exposed metallic part and measure the voltage present.

Check that any potential does not exceed 0.75 volt RMS. A leakage current tester (Simpson Model 229, Sencore Model PR57 or equivalent) may be used in the above hot check, in which case any current measure must not exceed 1/2 milliamp. In case any measurement is out of the limits specified, there is a possibility of a shock hazard and the set must be repaired and rechecked before it is returned to the customer.

Hot Check Circuit



X–Radiation

WARNING: The potential source of X–radiation in TV sets is the High Voltage section and the picture tube.

NOTE: It is important to use an accurate, periodically calibrated high voltage meter.

Adjust BRIGHTNESS, PICTURE, SHARPNESS and COLOR controls to minimum.

Measure the High Voltage. The high voltage meter should indicate:

High Voltage Reading

13"	23.25kV ±1.25kV
20"	28.75kV ±1.25kV

If the upper meter indication is out of tolerance, immediate service and correction is required to insure safe operation and to prevent the possibility of premature component failure.

Horizontal Osc. Disable Circuit Test

This test must be made as a final check before the set is returned to the customer. See HORIZONTAL OSC. DISABLE CIRCUIT PROCEDURE CHECK in this manual.

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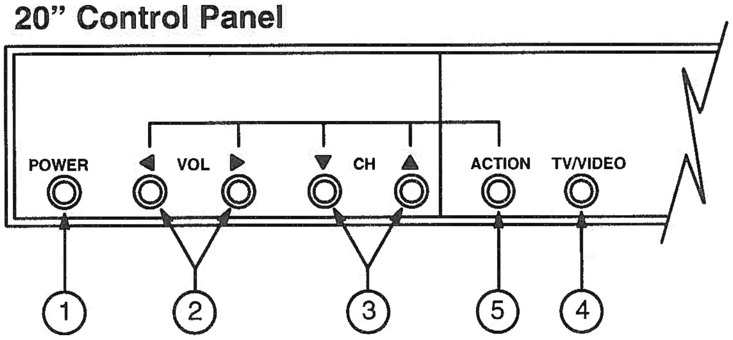
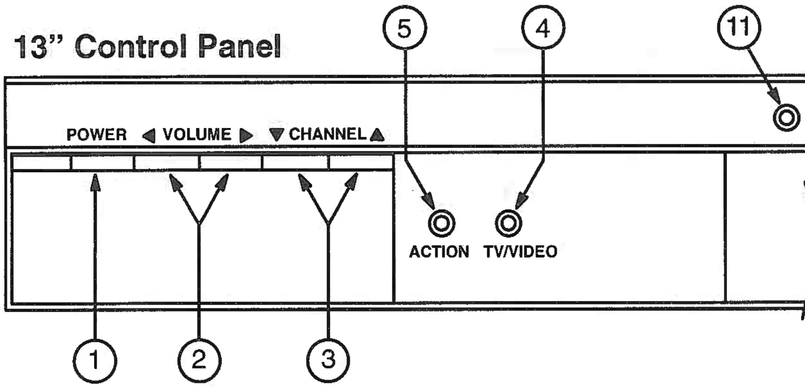
Followed by 2 Large Separate Schematic Sheets With All Schematics, Voltage Charts, Waveforms, Notes, Printed Wiring Boards & Audio/Video Block Diagrams.

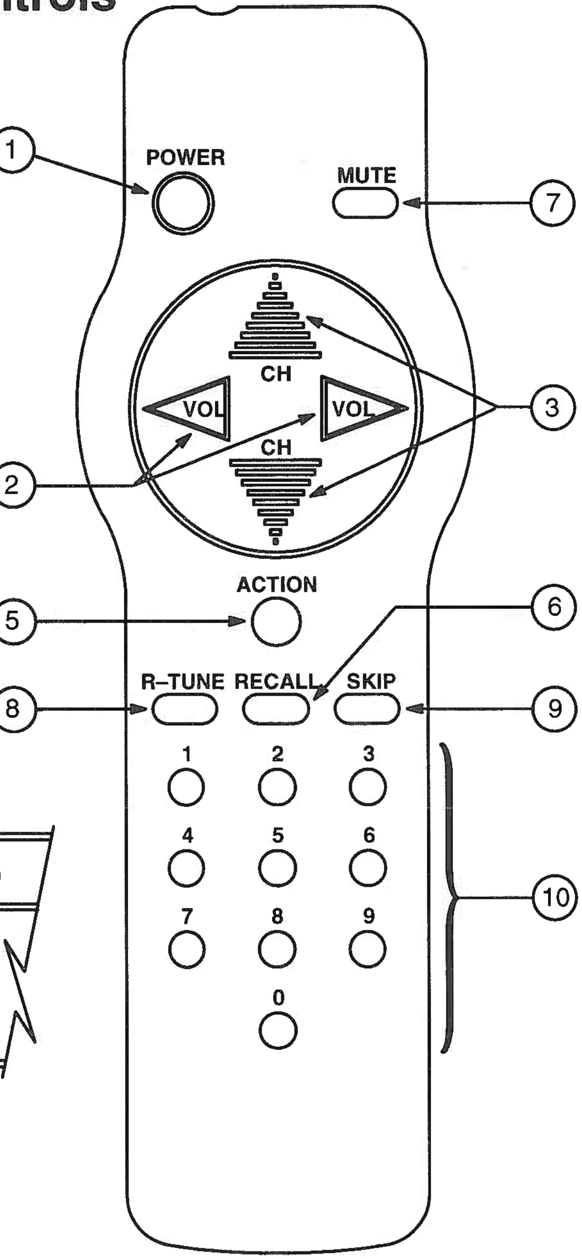
Location of Controls

20" Control Panel



13" Control Panel





Quick Reference Control Operation

① **Power Button** – Press to turn ON or OFF.

② **Volume Buttons** – Press to adjust Sound Level. Press to adjust Audio Menus, Video Menus, and select operating features when menus are displayed.

③ **Channel Buttons** – Press to select programmed channels. Press to select desired features when menus are displayed.

④ **TV/Video Button (On Receiver)** – Press to select TV or one of two Video Inputs.

⑤ **Action Button** – Press to display Main Menu and access On Screen feature and Adjustment Menus.

⑥ **Recall Button** – Press to display Time, status of Sleep Timer, Channel, Video Mode and Audio Mode.

⑦ **Mute Button** – Press to mute sound. A second press returns sound.

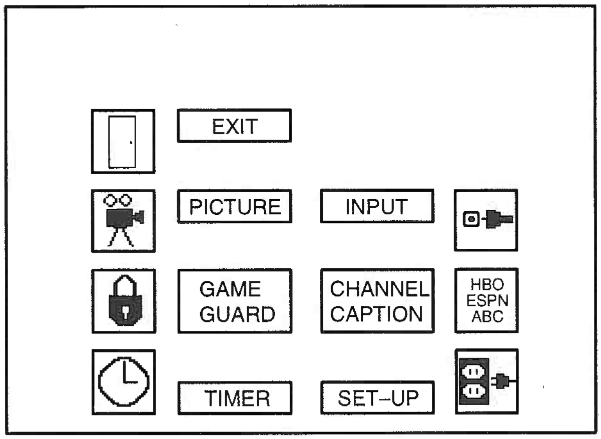
⑧ **R–Tune (Rapid Tune) Button** – Press to switch between two channels.

⑨ **Skip Button** – Press the SKIP button repeatedly to select desired time, up to three minutes, then select any other channel(s) or Video Mode. When the time elapses you will automatically return to the original channel.

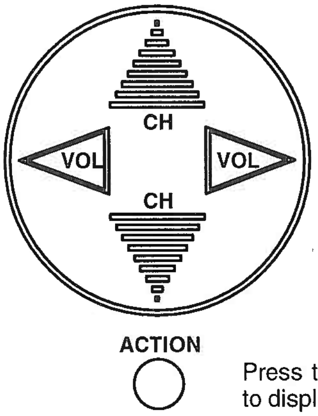
⑩ **Keyboard "0 through 9" Buttons** – Press desired channel number to access any channel.

⑪ **Earphone Jack** – Plug in an optional earphone for private monitoring of sound. (Located on cabinet front or right side, depending on model.)

Main Menu (Icons)



Located On Remote Control

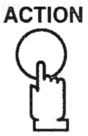


Use the CH UP or DOWN and VOL LEFT or RIGHT buttons to select the desired Icon when the Main Menu is displayed. (The selected Icon will be indicated in red.)

Press the ACTION button to display the Main Menu.

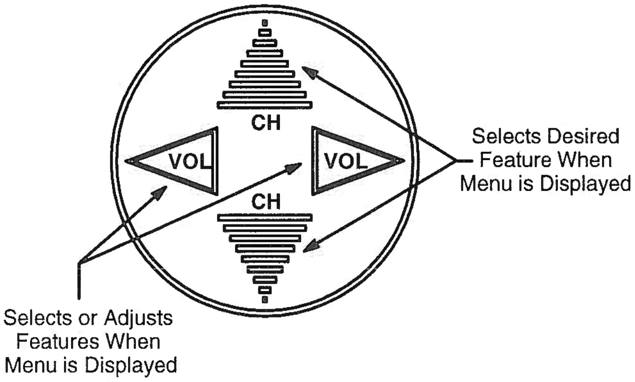
1. Press the ACTION button to display the Main Menu with Icons.
2. Press the CH UP or DOWN and the VOL LEFT or RIGHT buttons to select the desired Icon when the Main Menu is displayed.
3. Press the VOL buttons for left and right movement and the CH buttons for up or down movement.
4. To exit the Main Menu first select the EXIT Icon, then press the ACTION button.

Game Guard



Displays and Exits Menus

Located On Remote Control

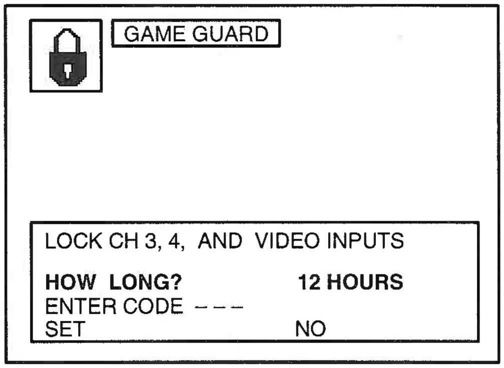

CH
VOL
VOL
CH
Selects Desired Feature When Menu is Displayed
Selects or Adjusts Features When Menu is Displayed

Game Guard (Lockout)

Game Guard (Lockout) – Prevents video games and other video sources from being viewed. Channel 3, 4 and all video inputs are locked out for 12, 24 or 48 hours.

NOTE: Be sure to understand this feature before attempting its use. **Use a code that you will easily remember.**

1. Press the ACTION button to display the Main Menu.
2. Press the CH DOWN button to select the Game Guard Icon.
3. Press the ACTION button to display the Game Guard Menu.



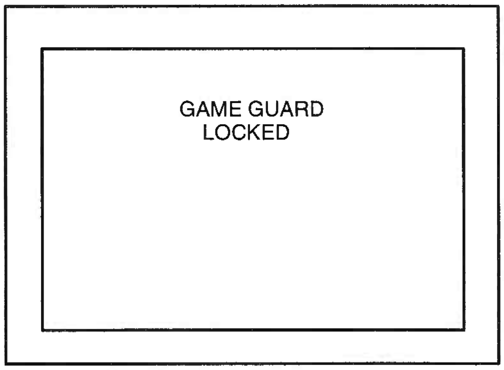
GAME GUARD

LOCK CH 3, 4, AND VIDEO INPUTS

HOW LONG? **12 HOURS**
ENTER CODE – – –
SET NO

4. Press the VOL RIGHT button to select the desired hours (12, 24 or 48) for Game Guard (Lockout) to be activated.
5. Press the CH DOWN button to select "ENTER CODE". Then enter a 3 digit code with the Remote Control Keyboard.

   Important NOTE: Use a code you can easily remember.
6. Press the VOL LEFT or RIGHT button after entering three digit code. "Game Guard Locked" will display On Screen.



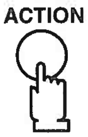
GAME GUARD
LOCKED

Game Guard Activated

Game Guard (Unlock)

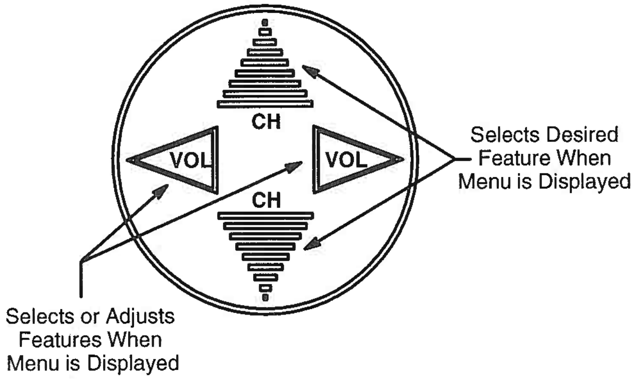
To unlock the Game Guard feature, repeat steps 1 through 3. Enter the same 3 digit code previously used in step 5 with Remote Control Keyboard.

CC Mode



Displays and Exits Menus

Located On Remote Control


CH
VOL
VOL
CH
Selects Desired Feature When Menu is Displayed
Selects or Adjusts Features When Menu is Displayed

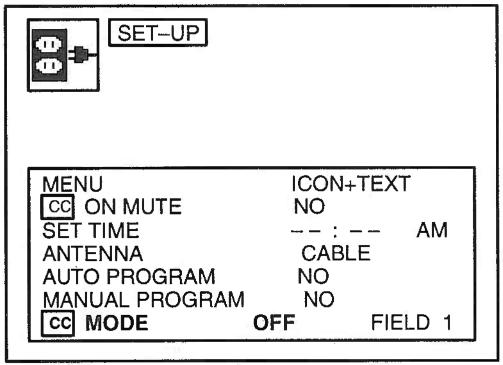
Helpful Hints:

- Closed Caption information may be transmitted on either or both Caption Fields.
- Most Closed Caption information is transmitted on Field 1 in Cap C1 Mode.
- De–select Text mode if large portion of the picture is blanked out.

Closed Caption Mode

This Receiver has a built in decoder that provides a visual depiction of the audio portion of a television program in the form of written words across the screen (White or Colored letters on a black background). It allows the viewer to read the dialogue of a television program or other information.

1. Press the ACTION button to display the Main Menu.
2. Press the CH DOWN and VOL RIGHT buttons to select the Set–Up Icon.
3. Press the ACTION button to display the Set–Up Menu.



```
SET–UP

MENU              ICON+TEXT
CC ON MUTE        NO
SET TIME          – – : – –     AM
ANTENNA           CABLE
AUTO PROGRAM      NO
MANUAL PROGRAM    NO
CC MODE        OFF          FIELD 1
```

4. Press the CH DOWN button to select “CC MODE”.
5. Press the VOL RIGHT button to select OFF, CAP C1, TEXT C1, CAP C2 or TEXT C2.
6. Press the CH DOWN button to select the Field position.
7. Press the VOL LEFT or RIGHT button to select “FIELD 1” or “ FIELD 2”.
8. Press the ACTION button twice to exit the Set–Up Menu.

- CAPTION OFF – Recommended mode when you do not wish to view Closed Caption.
- CAPTION C1 – For video related information that can be displayed (up to 4 lines of script strategically placed on the television screen so that it does not obstruct relevant parts of the picture). Script can be in any language.
- TEXT C1 – Blanks out a large portion of the picture on the television screen, and displays program guide or any other information currently being transmitted.
- CAPTION C2 – Another mode used for video related information that can be displayed (up to 4 lines of script strategically placed on the television screen so that it does not obstruct relevant parts of the picture).
- TEXT C2 – Another mode which displays information and blanks out a large portion of the picture on the television screen.

Video/Audio In & Out Connections

The IN and OUT terminals located on the back of the Monitor/Receiver directly pass the input signals through the out terminals, so you may monitor or record the external Video/Audio information.

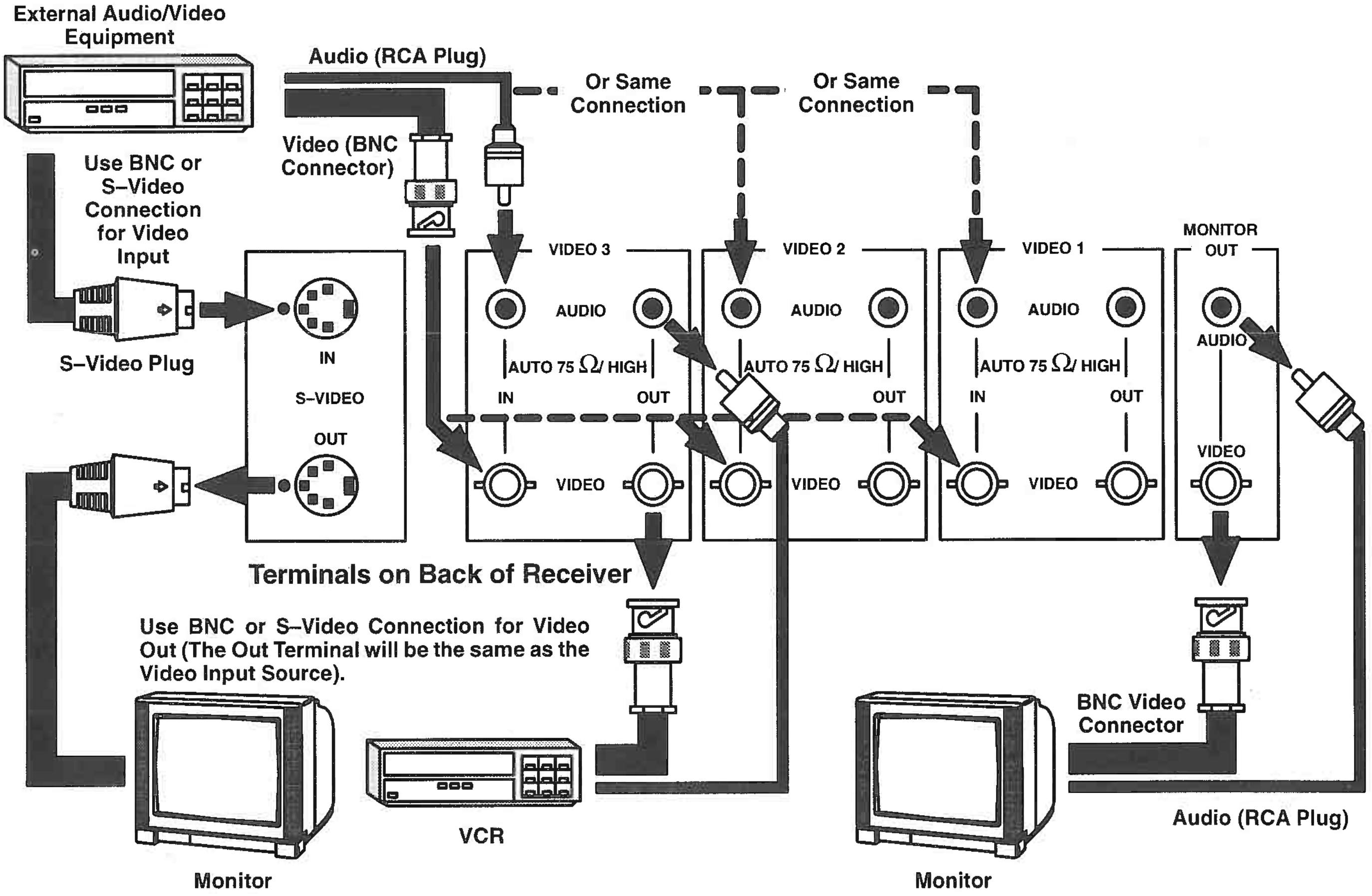
Operation

1. Connect an external Video/Audio source to the Monitor/Receiver, VIDEO 1, VIDEO 2 OR VIDEO 3 IN terminals, as shown.
2. Connect the same Video/Audio THROUGH OUT jacks to a Monitor or VCR as shown.

TV – Monitor/Receiver will be operating with "off the air signals" (signal received through the VHF/UHF terminal). (See Ant Connection Section.)

VIDEO 1, 2 or 3 – Receiver will be operating with the external Video/Audio signals. The THROUGH OUT jacks will provide the same signals for monitoring or recording.

NOTE: VIDEO 1, 2 and 3 OUTPUT terminals will operate whether the Monitor/Receiver is ON or OFF.



Monitor Out Connection

The Monitor Out terminals will output Audio and Video signals being displayed.

NOTE: The Monitor Out terminals only operate when the Monitor/Receiver is On.

Monitor Out Connection

Terminal	Level	Impedance	Connector
MONITOR OUT (AUDIO)	500mV rms	10K OHM MIN	RCA PHONO
MONITOR OUT (VIDEO)	1.0V p–p	75 OHMS	BNC

Disassembly For Service

Back Cover

Remove all screws indicated by ⬅ on back of set.

1. (13") Remove 8 screws around perimeter of cabinet.
2. (20") Remove 6 screws around perimeter of cabinet.
3. Remove 6 screws around perimeter of A/V Block,

A–Board – Main Chassis

1. Slide chassis completely out of guide rails.
   NOTE: Some tie–wraps securing wire dressings may have to be unfastened for chassis removal.
2. Stand chassis on it's edge. Now underside is completely accessible for service and component removal.

C–Board – CRT Output

1. Plugs into socket on CRT neck.

G–Board – Audio/Video External Input Jacks

H–Board – S–Video Input/Output Terminal

These Boards are soldered to an A/V Jack assembly that is secured to the Main Board (A),IC801 heat sink.

J–Board – Earphone Jack

1. Mounted to cabinet escutcheon and secured by 1 screw.

R–Board – Remote Receiver

1. Secured to cabinet escutcheon by plastic clips. Use small screwdriver to gently lift clips and pull board out.

X–Board – A/V Switching –Comb Filter.

1. Plugs into the A–Board at connectors A2 & A3.

3 Wire Line Cord

1. The line cord is soldered to A–Board at M1,M2 and A14. The center wire of the line cord is A14.

Disassembly for CRT Replacement

1. Discharge CRT as instructed in Safety Precautions.
2. Disconnect yoke plug, degaussing coil plug, speaker plug (SP) and Remote Receiver (A8) from Main board along with CRT 2nd anode button.
3. Remove C–Board from CRT neck and unplug black wire (CRT dag ground) from board.
4. Slide main chassis assembly completely out. Remove with CRT Board.

CRT Replacement (20" Model)

1. Perform DISASSEMBLY FOR CRT REPLACEMENT procedure.
2. Insure CRT H.V. anode button is discharged before handling CRT. See SAFETY PRECAUTIONS on handling the picture tube.
3. Remove components on CRT neck and place cabinet face down on a soft pad.
4. Note original order of CRT mounting hardware as you remove them from CRT mounting brackets at each corner of CRT.
5. Remove CRT with degaussing coil and dag ground braid attached.
6. Note original locations and mounting of degaussing coil and dag ground assembly to insure proper reinstallation on the replacement CRT.
   To remove degaussing coil:
   - Cut 4 plastic ties that retain degaussing coil to CRT mounting ears. These ties must be replaced when installing degaussing coil on replacement CRT.

   To remove dag ground braid:
   - Unhook coil spring from lower left CRT ear.
   - Release braid loop from upper right CRT ear.
7. Mount dag ground braid on replacement CRT. Replace degaussing coil with new ties. Dress coil as original.
8. Replace components on CRT neck and re–install into cabinet. Make sure all ground wires and circuit board plugs get connected.

CRT Replacement (13" Model)

1. Perform DISASSEMBLY FOR CRT REPLACEMENT procedure.
2. Insure CRT H.V. anode button is discharged before handling CRT. See SAFETY PRECAUTIONS on handling the picture tube.
3. Remove components on CRT neck and place cabinet face down on a soft pad.
4. Note original order of CRT mounting hardware as you remove them from CRT mounting brackets at each corner of CRT.
5. Remove CRT with dag ground braid attached.
6. Note original locations and mounting of degaussing coil and dag ground assembly to insure proper reinstallation.
   To remove degaussing coil:
   - Note that degaussing coil is retained in position to the cabinet body. (It doesn't need removal.)

   To remove dag ground braid:
   - Unhook coil spring from upper right CRT ear.
   - Release braid loop from lower left CRT ear.
7. Mount dag ground braid on replacement CRT. Replace degaussing coil with new ties. Dress coil as original.
8. Replace components on CRT neck and re–install into cabinet. Make sure all ground wires and circuit board plugs get connected.

Purity and Convergence Procedure

Adjustment should be necessary only if the CRT or deflection yoke is replaced or if someone has disturbed the setting. The complete procedure consists of:

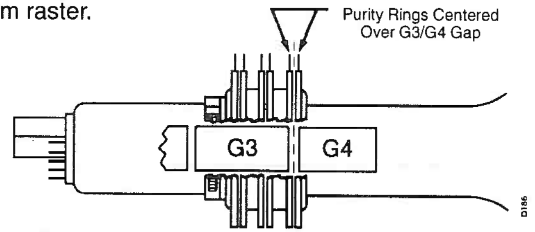
1. Initial static convergence
2. Setting purity
3. Final static convergence

When CRT or Yoke is Replaced

Place the yoke on the CRT neck (do not tighten clamp).

Position purity/convergence assembly as shown and tighten clamp snugly. Cut hot–melt glue seal on assembly and place like tabs of purity device together at 12 o'clock to reduce its magnetic field effect. Manually degauss CRT.

Turn Receiver ON and slide deflection yoke back and forth on neck of CRT. Stop at position that produces a near white, uniform raster.



Positioning of Purity/Convergence Assembly

Initial Center Static Convergence

Connect dot/crosshatch generator to Receiver and tune in signal. Observe misconvergence at center of screen only.

Adjust 4 pole magnet (center rings): separate tabs and rotate device to converge blue with red.

Adjust 6 pole magnet (rear rings): separate tabs and rotate device to converge blue and red (magenta) with green. **NOTE:** Precise convergence at this point is not important.

Purity Adjustment

When in the Serviceman Mode for making electronic adjustments, Press the Remote Control (RECALL) button to enter Purity Check. (See Service Adjustments Electronic Controls.)

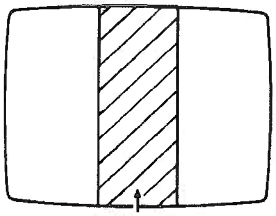
Operate the Receiver for 60 minutes using the first Purity check field (white screen) to stabilize the CRT.

Degauss the Receiver fully by using an external degaussing coil.

Press the Remote Control (RECALL) button again until the Purity Check (green screen) appears.

Loosen the deflection yoke clamp screw and move the deflection yoke back as close to the purity magnet as possible.

Adjust the front rings to set the vertical green raster precisely at the center of the screen. (Shown below.)



Green Raster

Slowly move the deflection yoke forward and adjust for the best overall green screen.

Tighten the deflection yoke clamp screw.

Press the Remote Control (RECALL) button again until the Purity Check (blue screen) and (red screen) appear and observe that good purity is obtained on each respective field.

Press the Remote Control (RECALL) button again until Purity check (white screen) appears. Observe the screen for uniform white. If not, repeat above procedure.

Final Convergence Procedure

NOTE: Before attempting convergence adjustment, vertical size and focus adjustments must be completed. Connect a dot pattern generator to the set. The brightness level should be no higher than necessary to obtain a clear pattern.

Converge the red and blue dots at the center of the screen by rotating the 4 pole (R with B) Static Convergence Magnets.

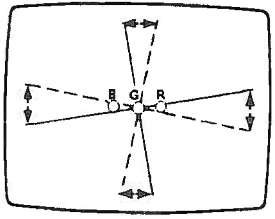
Align the converged red/blue dots with the green dots at the center of the screen by rotating the 6 pole (R/B with G) Static Convergence Magnets. Melt wax with soldering pencil to reseal magnets.

Slightly tilt (do not rotate) the deflection yoke vertically and horizontally to obtain good overall convergence.

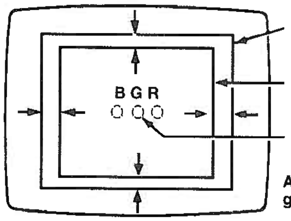
After vertical adjustment of the yoke, insert wedge at 11 o'clock position, then make the horizontal tilt adjustment.

Secure deflection yoke by inserting side two wedges at 3 and 7 o'clock positions.

Apply adhesive between tab (thin portion) of wedge and CRT and place tape over tab to secure to CRT.



As the yoke is moved vertically, the rasters produced by the outside guns rotate in opposite directions.

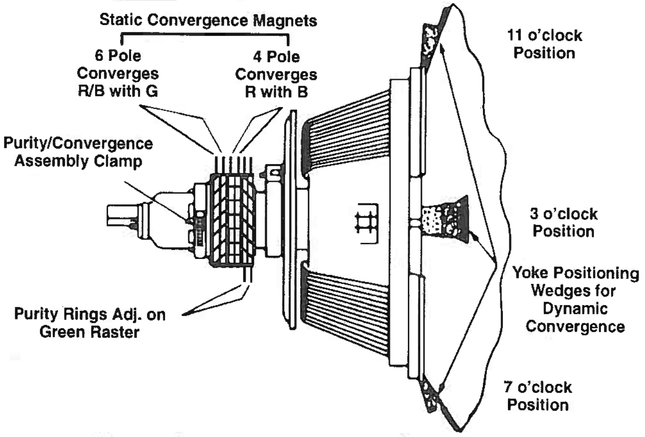


Raster produced from one of the outside electron beams

Raster from the other outside electron beam

Static convergence magnets are set for center convergence

As the yoke is moved horizontally, one raster gets larger while the other gets smaller


Static Convergence Magnets
6 Pole Converges R/B with G
4 Pole Converges R with B
Purity/Convergence Assembly Clamp
Purity Rings Adj. on Green Raster
11 o'clock Position
3 o'clock Position
Yoke Positioning Wedges for Dynamic Convergence
7 o'clock Position

Permalloy Convergence Corrector Strip (Part No. OFMK014ZZ)

This strip is used in some sets to match the yoke and CRT for optimum convergence. If the yoke or CRT is replaced, the strip may not be required.

First converge the set without the strip and observe the corners.

If correction is needed:

1. Place strip between CRT and yoke, in quadrant needing correction. Slowly move it around for desired results.
2. Press adhesive tightly to the CRT and secure with tape.

Service Notes

IMPORTANT: To protect against possible damage to solid state devices due to arcing or static discharge, make certain all ground wires and CRT DAG wire are securely connected.

CAUTION: The power supply circuit is above earth ground and the chassis cannot be polarized. Use an isolation transformer when servicing to avoid damage to test equipment or chassis. Connect test equipment to correct ground (⊥) or (⏚) when servicing or incorrect readings will occur.

WARNING: This Receiver has been designed to meet or exceed applicable safety and X–radiation protection as specified by government agencies and independent testing laboratories.

To maintain original product safety design standards relative to X–radiation and shock and fire hazard, the parts shown in the BOXED areas of the schematic must be replaced with identical replacement parts. Order parts from the manufacturer's parts center using numbers shown in this service manual or give complete chassis number and part reference number.

For optimum performance and reliability, all other parts should be replaced with components having identical specifications.

Horiz Osc Disable Circuit

This chassis employs a special circuit to protect against excessive high voltage and beam current. If for any reason the high voltage and beam current exceed a predetermined amount, this circuit operates and detunes the horizontal oscillator. This limits high voltage.

The over–voltage protection circuit is not adjustable. However, if components in the BOXED areas of the schematic in either the horizontal sweep system or the over–voltage protection circuit itself are changed the operation of the circuit should be checked using the following procedure.

Equipment needed to check disable circuit:

1. Accurate voltmeter (0 – 200V scale)
2. High Voltage Meter (0 – 40kV)
3. Variac and Isolation Transformer

Procedure

1. Tune in a station to verify horizontal is in sync.
2. Obtain Monoscope pattern or signal generator crosshatch pattern.
3. Connect voltmeter (–) to TPD2 and (+) to TPD1. Adjust BRITE to (0) and PICTURE for 0.9 volt reading on voltmeter.
4. Turn Receiver OFF. Connect jumper across R802 (20W) Resistor.
5. Reduce AC supply voltage to approx. 100V. Connect high voltage meter to CRT 2nd anode (H.V. button). **NOTE:** Use Dag Ground for minus (–) lead connection of meter.
6. Turn Receiver ON. Slowly raise AC supply voltage and confirm that high voltage does not exceed voltge noted in the chart when horizontal just begins to pull out of sync.

High Voltage Reading

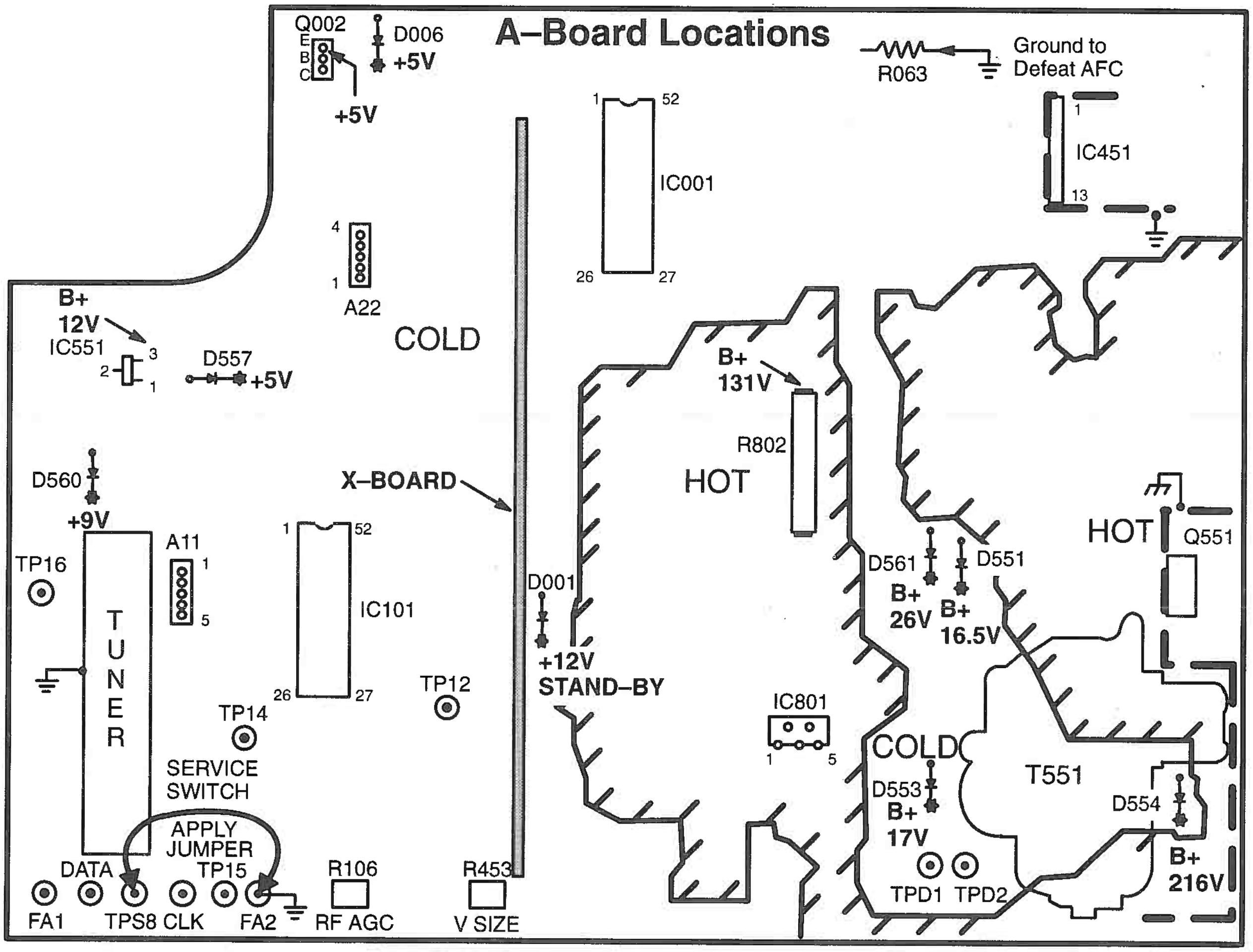
13"	20"
27kV	34.2kV

If high voltage is not within the specified limit, the cause must be determined before the Receiver is returned to the customer.

Service Adjustment Procedures

ALL SERVICE ADJUSTMENTS ARE FACTORY PRESET AND SHOULD NOT REQUIRE ADJUSTMENT UNLESS CONTROL AND/OR ASSOCIATED COMPONENTS ARE REPLACED.

NOTE: CONNECT MINUS LEAD OF VOLTMETER TO CORRECT GROUND FOR CIRCUIT BEING CHECKED. WHEN NECESSARY TO USE A LINE OPERATED GROUND, THE GROUND INDICATION (⊥) WILL BE INDICATED. FOR THIS GROUND, USE Q551 HEAT SINK. FOR ALL OTHER CIRCUITS, CONNECT MINUS LEAD OF VOLTMETER TO LINE ISOLATED GROUND (⏚)TUNER SHIELD, IC451 HEAT SINK OR FA2.



131.0V B+ Voltage Confirmation

1. Set BRIGHT and PICTURE by using Picture Menu to Minimum.
2. Connect a DVM between R802 (IC801 pin 4 side) and Hot ground (⊥).
3. Confirm that B+ voltage is 131.0V±1.0V. This voltage supplies B+ to Horizontal Output & Flyback circuits.

Source Voltage Chart

120V AC line input. BRIGHT and PICTURE of Picture Menu adjusted to Minimum. Use cold ground (⏚) for minus lead of DVM.

Pin 3 of IC551	+12.0V ±1V
Cathode of D551 (TPD9)	+16.3V ±1V
Cathode of D553	+17.0V ±2V
Cathode of D561 (TPD8)	+26.0V ±1V
Cathode of D554	+220V ±15V

Adjust Picture menu for normalized video adjustments.

B+ 5V Source Voltages

Volatile 5V:

Cathode D557 = Tuner BP, IC101 (B+ V_{cc}), RF AGC (R106).

MPU 5V:

Emitter Q002 = IC001(V_{DD}), IC003.

Standby 5V:

Cathode D006 = Keyboard, IC001 (Key in 1, I^2C EEPROM (IC002), TIMER L.E.D, Remote Receiver.

B+ 9V Source Voltage

Cathode D560 = IC101 (B+ V_{cc}) (HOLD DOWN) (AFC OUT), Q306 – Q305 (Video), Q307 (Closed Caption E.F.), IC001 (Audio Control B/T/B).

B+ 12V (Stand–by)

Cathode D001 = RL001 (on–off relay), Q002 (+5V Reg), IC101 (Horiz. Vcc).

High Voltage Check

1. Select an active TV channel and confirm that horizontal is in sync.
2. Adjust Brightness and Picture using Picture Icon menu so video just disappears
3. Confirm B+ 131V is within limit.
4. Using a calibrated high voltage meter confirm that High Voltage is as indicated in the chart below.

13"	23.25kV ± 1.25kV
20"	28.75kV ± 1.25kV

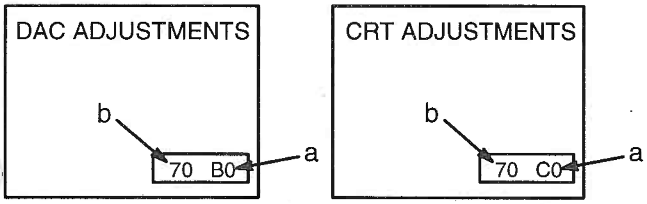
Serviceman Mode (Electronic Controls)

This chassis has new electronic technology using the I^2C Bus Concept. The system usually performs as a control function and replaces many of the required mechanical controls. Instead of adjusting various mechanical controls individually, many of the control functions are now performed electronically by using "On Screen Menu". (The Serviceman Adjustment Mode.)

NOTE: It is suggested that a serviceman read all the way through and understand the following procedure for Entering/Exiting the Serviceman Adjustment Mode; then proceed to follow the instructions working with the Receiver. After a person is familiar with this adjustment procedure, use the Instructional Flow Chart for Serviceman Mode as a quick guide.

Entering Serviceman Mode:

1. While the Receiver is ON and operating in Normal Mode, momentarily short test point FA1 to cold ground (⏚) FA2.
   "The Receiver enters the Aging Mode".
   (The VOLUME UP/DOWN will adjust rapidly.)
2. **Press** ACTION button and VOLUME UP button on Receiver Control Panel simultaneously.
   "The Receiver enters the Servicemans Mode".
   (The VOLUME UP/DOWN will adjust normally.)
   (All customer controls are set to a nominal level.)
3. **Press** the POWER button on the Remote Control to select one of three Serviceman Adjustment Modes.
   - B = Serviceman DAC ADJUSTMENTS
   - C = Serviceman CRT ADJUSTMENTS
   - Normal TV = Normal operation of channel ▲▼ and volume ▲▼



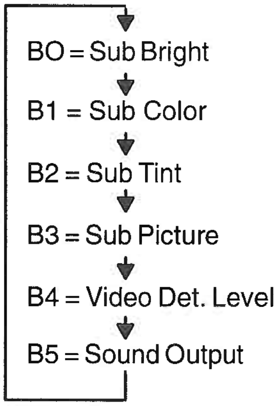
An Address Menu appears in the bottom right hand corner of the screen.

For DAC Adjustments:

a.) Press
CHANNEL UP/DOWN or DIAMOND UP/DOWN on the Remote Control to select any of 6 Service Adjustment Addresses.

Important Note: Write down the original value (b in detail) for each address adjustment before adjusting anything. It is easy to adjust the wrong item.

b.) Press
VOLUME UP/DOWN or DIAMOND RIGHT/LEFT on the Remote Control to adjust the level of the selected Service Adjustment.



Adjustment Range and Default level values for Service Adj.

Service Adjustment	Adj Range	Default Level
Sub Bright (BO)	0 ~ 127	67
Sub Color (B1)	0 ~ 63	33
Sub Tint (B2)	0 ~ 63	33
Sub Picture (B3)	0 ~ 63	approx. 35
Video Detector Level (B4)	0 ~ 15	8
Sound Out (B5)	0 ~ 15	8

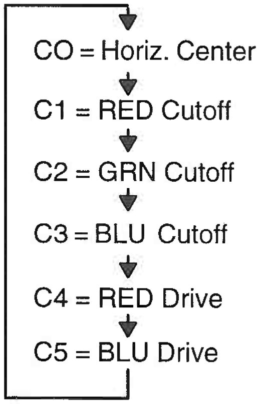
Press the POWER button on the Remote Control to select Serviceman CRT Adjustment Mode.

For CRT Adjustments:

a.) Press
CHANNEL UP/DOWN or DIAMOND UP/DOWN on the Remote Control to select any of 6 Service Adjustments.

Important Note: Write down the original value (b in detail) for each address adjustment before adjusting anything. It is easy to adjust the wrong item.

b.) Press
VOLUME UP/DOWN or DIAMOND RIGHT/LEFT on the Remote Control to adjust the level of the selected Service Adjustment.



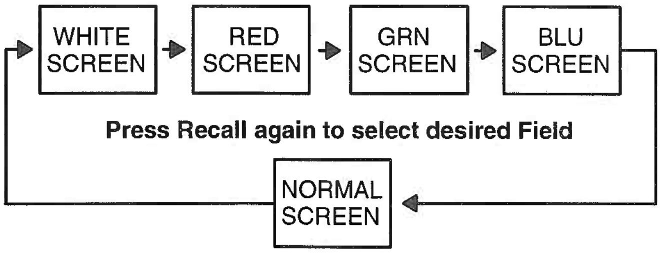
Adjustment Range and Default level values for Service Adj.

CRT Adjustment	Adj Range	Default Level
Horiz Centering (C0)	0 ~ 15	8
RED Cutoff (C1)	*0 ~ 511	128
GRN Cutoff (C2)	*0 ~ 511	128
BLU Cutoff (C3)	*0 ~ 511	128
RED Drive (C4)	0 ~ 255	128
BLU Drive (C5)	0 ~ 255	128

*Adjustment indicated in 2 steps (0 ~ 255) ➨ (H0 ~ H255)

To Check Purity:

Press the RECALL button on the Remote Control to enter Purity Field Check Mode.
NOTE: Must be in Serviceman Mode to get color.



IMPORTANT NOTE:
Always Exit Serviceman Mode After Use.

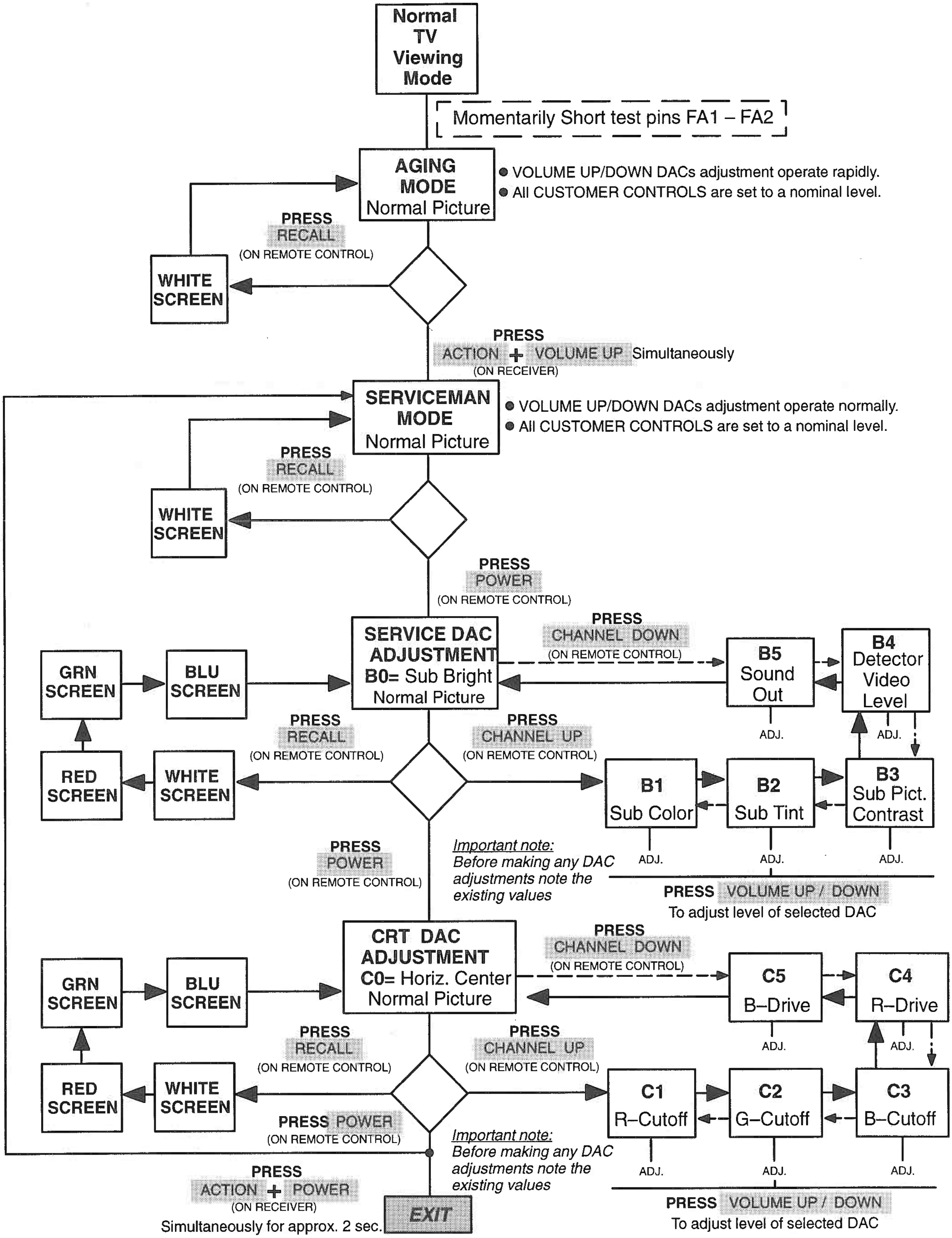
Exit Serviceman Mode:

1. Press ACTION + POWER buttons simultaneously for approximately 2 seconds.
   "The Receiver exits Serviceman Mode".

The Receiver momentarily shuts off; then comes back on tuned to channel 3 with a preset level of sound.

Instructional Flow Chart for Serviceman Mode

Caution: Always EXIT Serviceman Mode after use



Receiver shuts off; then turns on, TUNED TO CHANNEL 3 WITH A PRESET LEVEL OF SOUND.

Note: This will also erase any Programmed Channels, Channels Caption data and some other user defined items.

Service Adjustments (Electronic Controls)

Sub–Brightness

Serviceman DAC Adjustment (B0)

Adjustment of this control is important for getting proper operation of customer brightness and picture controls. This adjustment must be made after Sub–Contrast or Color Temperature adjustments are made. **Do not adjust** SCREEN after Sub–Brightness is set.

Preparation

1. Connect a color bar signal with 100 IRE white and 7.5 IRE black. (Switch Color "OFF" on the generator.) Operate television for a minimum of 10 minutes prior to the adjustment.

Procedure

1. In Serviceman Mode for making electronic adjustments, select DAC adjustment (B0) and adjust so the black bar starts to look grey. Then decrease the adjustment to the point where grey turns to black.

Video Detector Level

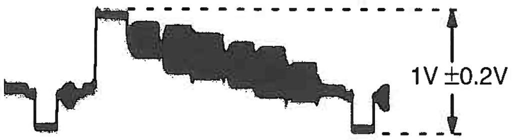
Serviceman DAC Adjustment (B4)

Preparation

1. Obtain an NTSC color bar pattern with 100 IRE white and 87.5% modulation.
2. Connect oscilloscope to TP12. Use cold ground for scope connection. Set scope at Horizontal rate (20µs) time base.

Procedure

1. In Serviceman Mode for making electronic adjustments, select DAC Adjustment (B4) and adjust for 1V from sync tip to white level. See detail.



2. Set SUB–CONTRAST adjustment (DAC adjustment B3).

Sub Contrast

Serviceman DAC Adjustment (B3)

This adjustment is factory set. **Do not adjust** unless repairs are made to associated circuit, the CRT Board or the CRT is replaced.

Preparation

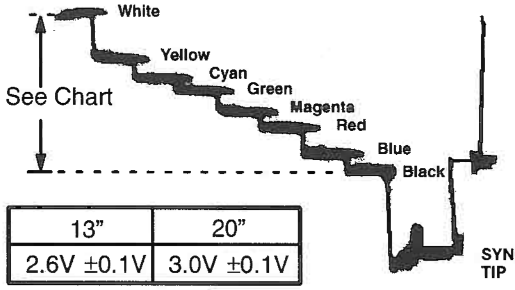
1. Connect a generator pattern with 87.5% modulation, 70% saturated color bar with a 100 IRE white and 7.5 black.

NOTE: The pattern used in this procedure is an EIA color bar pattern with 87.5% modulation with 100 IRE white and 7.5 black. Correlate the information in this procedure to your pattern used.

2. Connect oscilloscope to CRT–Board connector C1–2. Set scope horizontal time base to 20µs (horizontal).
3. Connect a 1K ohm jumper from TPD1 to +12V (IC551 pin 3)
4. Connect jumper from TPD2 to ground (⏚).

Procedure

1. In the Serviceman Mode for electronic adjustments, select DAC Adjustment (B3) and adjust for (Voltage shown in chart) from white level to black level on video waveform (see video waveforms detail).



13"	20"
2.6V ±0.1V	3.0V ±0.1V

2. Remove jumpers (Preparation steps 3 & 4).

Tint/Color Adjustment

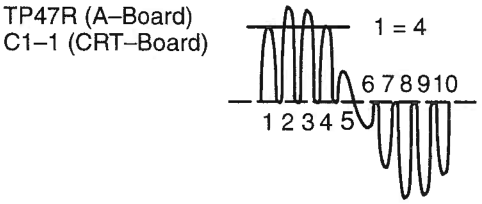
Serviceman DAC Adjustment (B2) (B1)

Preparation

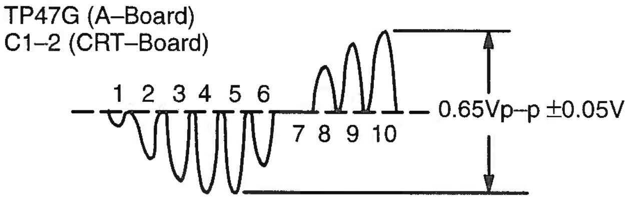
1. Connect a rainbow color bar signal.
2. Connect oscilloscope to TP47R (A–Board) or connector C1 pin 1 (CRT–Board).
3. Connect 1K ohm resistor jumper between IC551 pin 3 (+12V) and TPD1.
4. Connect jumper from TPD2 to GND (⏚).

Procedure

1. In serviceman Mode for making electronic adjustments, select DAC Adjustment (B2) and adjust waveform so peak 1 is the same as peak 4 as shown in the detail.



2. Connect oscilloscope to TP47G (A–Board) or connector C1 pin 2 (CRT–Board).
3. Select DAC adjustment (B1) and adjust for peak to peak waveform to be 0.65V p–p ±0.05V.



4. Remove jumpers (Preparation step 3 & 4).

Color Temperature Adjustment (B/W Tracking)

Serviceman DAC Adjust. (C1) (C2) (C3) (C4) (C5)

Minor Touch–Up Method

OBSERVE low and high brightness areas of a B/W picture for proper tracking. Adjust only as required for "good grey scale and warm highlights".

- LOW LIGHT areas – In Serviceman Mode for making electronic adjustments, select cutoff (C1) RED, (C2) GRN, (C3) BLU and adjust picture for grey.
- HIGH LIGHT areas – In Serviceman Mode for making electronic adjustments, select Drive (C4) RED, (C5) BLU and adjust for warm whites.

Complete Adjustment

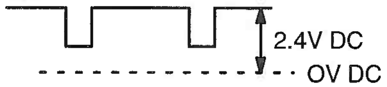
Preparation

1. Turn Receiver "ON" and allow 10 minutes warm up at high brightness.
2. Apply color bar signal with color "OFF".
3. Turn SCREEN control (part of FBT T551) fully counterclockwise.

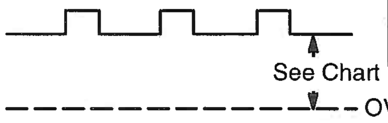
Procedure

Preset Serviceman DAC's C1, C2 and C3 levels to 128 for best results.

1. Connect oscilloscope to TP35 (CRT–Board).
2. In Serviceman Mode for making electronic adjustment, select Sub Bright (B0).
3. Connect jumper from TPS8 to FA2 (Ground ⏚).
4. Observe oscilloscope waveform at Horizontal rate and adjust Serviceman Mode Sub Bright DAC (B0) for scanning period of 2.4V above DC ground shown in detail.



5. Remove jumper. (Step 3)
6. Connect scope to GRN Cathode (KG) on CRT–Board.
7. In Serviceman Mode for making electronic adjustments, select GREEN CUTOFF DAC (C2).
8. Connect jumper from TPS8 to FA2.
9. View scope trace at Horizontal rate and adjust Serviceman Mode DAC (C2) for the scanning period to be (voltage shown in chart) above DC ground. (See Step 19 detail)
10. Remove jumper. (Step 8)
11. Connect scope to RED Cathode (KR).
12. In Serviceman Mode for making electronic adjustments, select RED CUTOFF DAC (C1).
13. Connect jumper from TPS8 to FA2.
14. View scope trace and adjust Serviceman Mode DAC (C1) for the scanning period to be (voltage shown in chart) above DC ground. (See Step 19 detail)
15. Remove jumper. (Step 13)
16. Connect scope to BLU Cathode (KB).
17. In Serviceman Mode for making electronic adjustments, select BLU CUTOFF (C3).
18. Connect jumper from TPS8 to FA2.
19. View scope trace and adjust Serviceman Mode DAC (C3) for the scanning period to be (voltage shown in chart) above DC ground. (See detail)



13"	140V
20"	175V

Adjustment Waveform Detail (Steps 9, 14, 19)

20. Turn Screen Control (part of FBT) slowly clockwise until a color horizontal line appears.
21. With the other two colors Serviceman Mode DAC CUTOFF adjustments (C1) RED, (C2) GRN, (C3) BLU; increase their colors to create a white horizontal line.
22. Remove jumper. (Step 18)
23. Confirm good gray scale by viewing B/W color bar pattern.
24 In Serviceman Mode for making electronic adjustments select DAC DRIVE adjustments (C4) RED, (C5) BLU and adjust for warm white in white color bar of pattern.
25. EXIT Serviceman Mode.
26. Adjust Picture Menu Video Adjustments BRIGHT and PICTURE from low scale to high scale and check Black and White tracking.
27. If correction needed: Re–Enter Serviceman Mode and perform **Minor Touch – Up Method.**
28. Perform SUB BRIGHTNESS adjustment procedure.

Horizontal Centering

Serviceman DAC Adjustment (C0)

Preparation

1. Connect crosshatch generator.

Procedure

1. In Serviceman Mode for making electronic adjustments. Select DAC adjustment (C0) and adjust so center of crosshatch pattern is centered on CRT screen.
2. EXIT Serviceman Adjustment Mode.

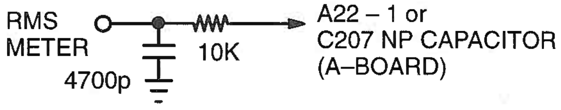
Sound Out

Serviceman DAC Adjustment (B5)

This adjustment is factory set and needs to be performed only when IC002 or IC101 is replaced.

Preparation

1. Connect 400Hz. 100% modulation (25KHz deviation) signal generator to antenna (70db ±5db, 75Ω open P/S 10db). Generator pre–emphasis must be "OFF" for 1KHz.
2. Connect RMS Meter with filter jig as shown in detail.



Procedure

1. In Serviceman Mode for making electronic adjustments, select DAC adjustment (B5) and adjust for RMS meter reading of:
250mV rms ±15mV rms
2. EXIT Serviceman Adjustment Mode.

Service Adjustments (Mechanical Controls)

RF AFC Delay R106

Adjust only if overloading on strong signal or busy background (snow) is present on moderate strength signals.

1. Adjust RF AGC control R106 until snow appears in picture, then adjust control until snow is eliminated.
2. Check all channels for optimum setting.

AFC Field Adjustment L103

1. Select TV signal mode with Menu.
2. Defeat AFC by applying jumper from TPS7 (R063) to ground (⏚).
3. Connect a digital voltmeter to AFC test point TP16.
4. Use Remote Control to Check all active High Band channels 7~13 for AFC voltage range. Select channel with AFC voltage in approximate center of voltage range.
5. Adjust L103 for 4.6V ±0.5V at TP16.
6. Check all active channels for proper AFC correction. Touch up L103 if required. Remove jumper in step 2.

NOTE: Do not use TV/CABLE channel with offset carriers for adjustment or in determination of low and high range of AFC voltage.

Sound Alignment L201

1. Select active TV channel.
2. Attenuate signal (loosely couple antenna lead or use RF attenuator pad) for noisy sound.
   - Adjust L201 for Maximum sound. Signal to noise ratio is best when L201 is peaked.
3. Connect antenna or remove RF attenuator for strong signal.

Vertical Size R453

1. Turn VERTICAL SIZE control R453 CCW until top and bottom edges of raster are visible.
2. Adjust VERTICAL SIZE control CW until top and bottom of raster touch bezel edge. Advance SIZE control CW an additional 30 degrees. This will be approximately 10% overscan. Linearity adjustment is automatic with size adjustment.

Focus (Part of T551)

Preparation

1. Connect Signal generator and select dot pattern.

Procedure

1. Adjust the FOCUS control to obtain the sharpest and clearest dot pattern.
   a.) adjust for best center.
   b.) adjust for best area between center and top right corner.

MPU Reference Oscillator C031

Preparation

1. Connect frequency counter from TPS1 (IC001 pin 25) to cold ground (⏚) .

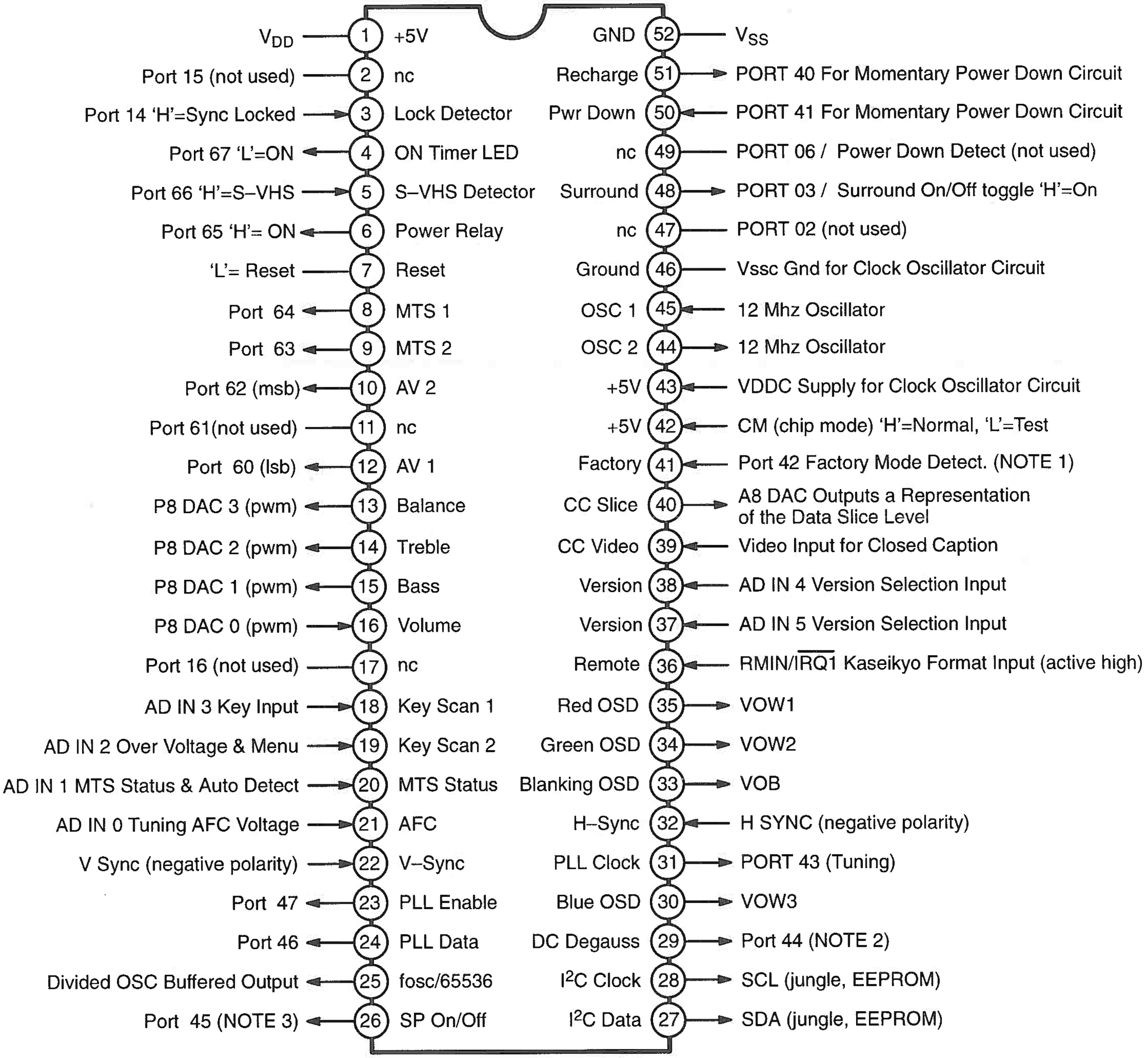
NOTE: Frequency counter probe capacitance should be 8PF or less.

Procedure

1. Turn Receiver “OFF” with AC power applied.
2. Adjust trimmer capacitor C031 for 5461.333µsec ±.033µsec (12MHz ±72Hz).

New Circuits

IC001 MPU IN/OUT Pins and Functions


V_{DD} — 1 — +5V
Port 15 (not used) — 2 — nc
Port 14 'H'=Sync Locked — 3 — Lock Detector
Port 67 'L'=ON — 4 — ON Timer LED
Port 66 'H'=S–VHS — 5 — S–VHS Detector
Port 65 'H'= ON — 6 — Power Relay
'L'= Reset — 7 — Reset
Port 64 — 8 — MTS 1
Port 63 — 9 — MTS 2
Port 62 (msb) — 10 — AV 2
Port 61(not used) — 11 — nc
Port 60 (lsb) — 12 — AV 1
P8 DAC 3 (pwm) — 13 — Balance
P8 DAC 2 (pwm) — 14 — Treble
P8 DAC 1 (pwm) — 15 — Bass
P8 DAC 0 (pwm) — 16 — Volume
Port 16 (not used) — 17 — nc
AD IN 3 Key Input — 18 — Key Scan 1
AD IN 2 Over Voltage & Menu — 19 — Key Scan 2
AD IN 1 MTS Status & Auto Detect — 20 — MTS Status
AD IN 0 Tuning AFC Voltage — 21 — AFC
V Sync (negative polarity) — 22 — V–Sync
Port 47 — 23 — PLL Enable
Port 46 — 24 — PLL Data
Divided OSC Buffered Output — 25 — fosc/65536
Port 45 (NOTE 3) — 26 — SP On/Off
GND — 52 — V_{SS}
Recharge — 51 — PORT 40 For Momentary Power Down Circuit
Pwr Down — 50 — PORT 41 For Momentary Power Down Circuit
nc — 49 — PORT 06 / Power Down Detect (not used)
Surround — 48 — PORT 03 / Surround On/Off toggle 'H'=On
nc — 47 — PORT 02 (not used)
Ground — 46 — Vssc Gnd for Clock Oscillator Circuit
OSC 1 — 45 — 12 Mhz Oscillator
OSC 2 — 44 — 12 Mhz Oscillator
+5V — 43 — VDDC Supply for Clock Oscillator Circuit
+5V — 42 — CM (chip mode) 'H'=Normal, 'L'=Test
Factory — 41 — Port 42 Factory Mode Detect. (NOTE 1)
CC Slice — 40 — A8 DAC Outputs a Representation of the Data Slice Level
CC Video — 39 — Video Input for Closed Caption
Version — 38 — AD IN 4 Version Selection Input
Version — 37 — AD IN 5 Version Selection Input
Remote — 36 — RMIN/$\overline{\mathrm{IRQ1}}$ Kaseikyo Format Input (active high)
Red OSD — 35 — VOW1
Green OSD — 34 — VOW2
Blanking OSD — 33 — VOB
H–Sync — 32 — H SYNC (negative polarity)
PLL Clock — 31 — PORT 43 (Tuning)
Blue OSD — 30 — VOW3
DC Degauss — 29 — Port 44 (NOTE 2)
I^2C Clock — 28 — SCL (jungle, EEPROM)
I^2C Data — 27 — SDA (jungle, EEPROM)

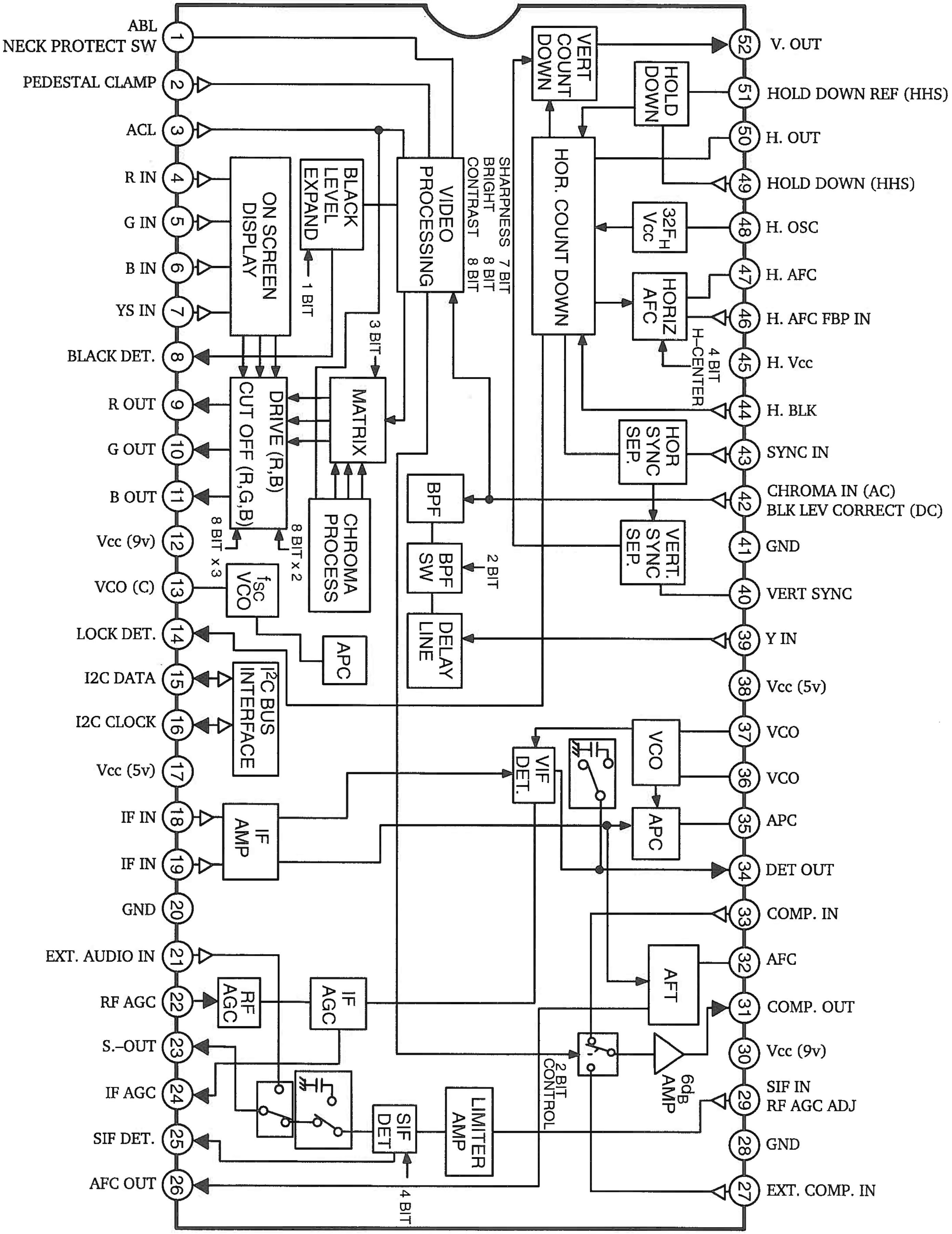
NOTE 1:
Momentarily pulling pin 41 to ground and releasing it will put the microprocessor into factory aging mode. Holding this line at ground will inhibit microprocessor access to I^2C bus line.

NOTE 2:
Timing for DC Degauss, 8 seconds after power on outputs a 'High' for 16 milliseconds, then returns to 'L'.

NOTE 3:
Speaker On/Off is also used as audio defeat line.

IC101 Block Diagram

INPUT PINS = ▷ ◁ OUTPUT PINS = ◀ ▶

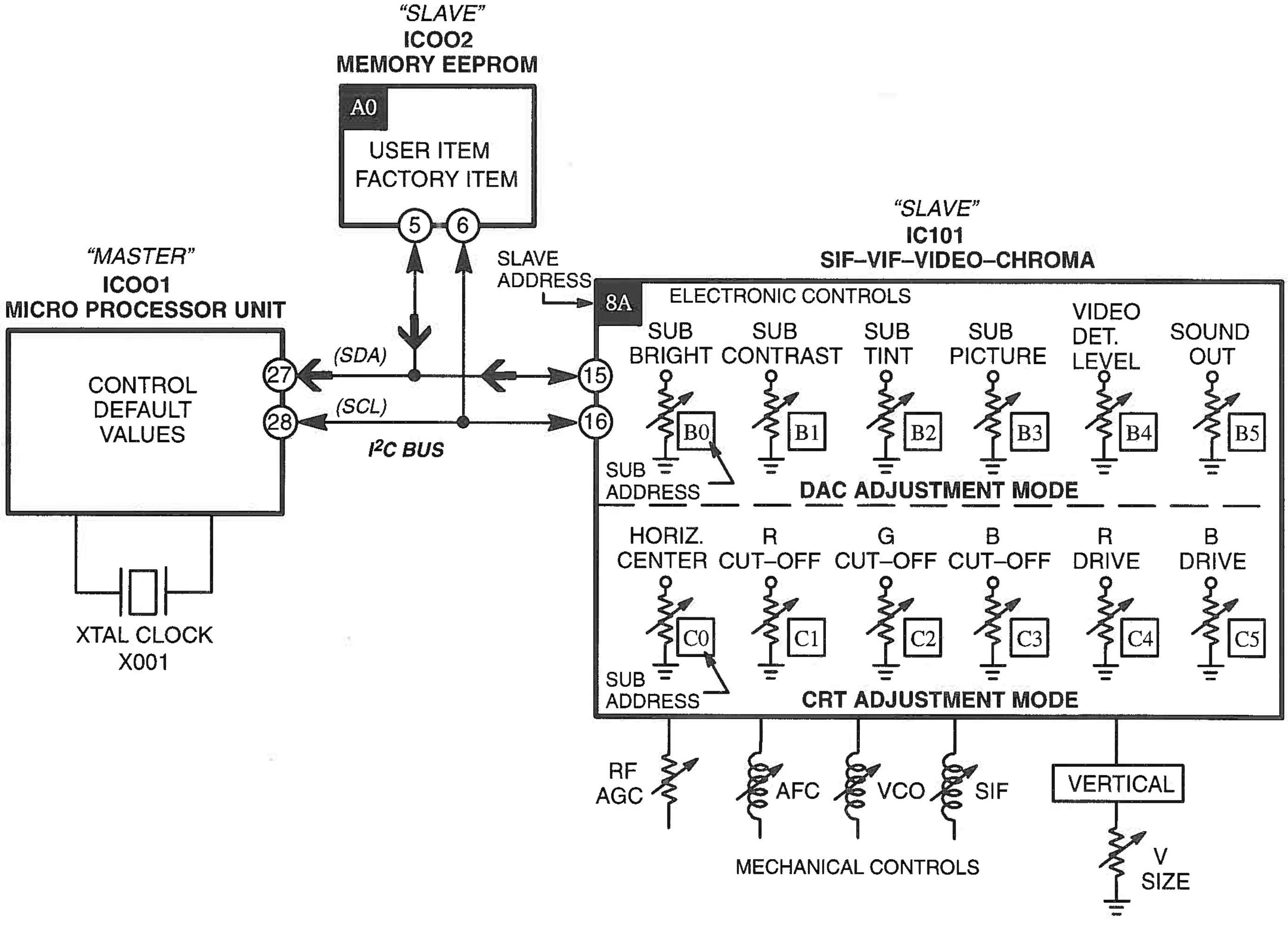


I^{2}C Bus Line System

This Receiver makes use of one of the latest electronic technologies by using an I^{2}C (Inter–Integrated Circuit) Bus Line Concept. Two wires, SDA (Serial Data) and SCL (Serial Clock) carry information between devices connected to the Bus. Each device connected to the Bus has a unique address for receiving data information ("Slave") from a source ("Master").

In this Receiver, the "Master" (Micro Processor Unit, IC001) is the device which initiates a data transfer in the Bus line and generates the clock signal required to permit the data to be sent. The "Slaves" (MEMORY I^{2}C EEPROM, IC002 and VIF–SIF–VIDEO–CHROMA JUNGLE, IC101) are the devices addressed by the MPU and receive the data transmitted.

This system usually performs as a control function and replaces many of the required mechanical controls needed in a television receiver. Instead of adjusting various mechanical controls individually, many of the control functions can be performed electronically using "On Screen Menus", (The Serviceman Mode).



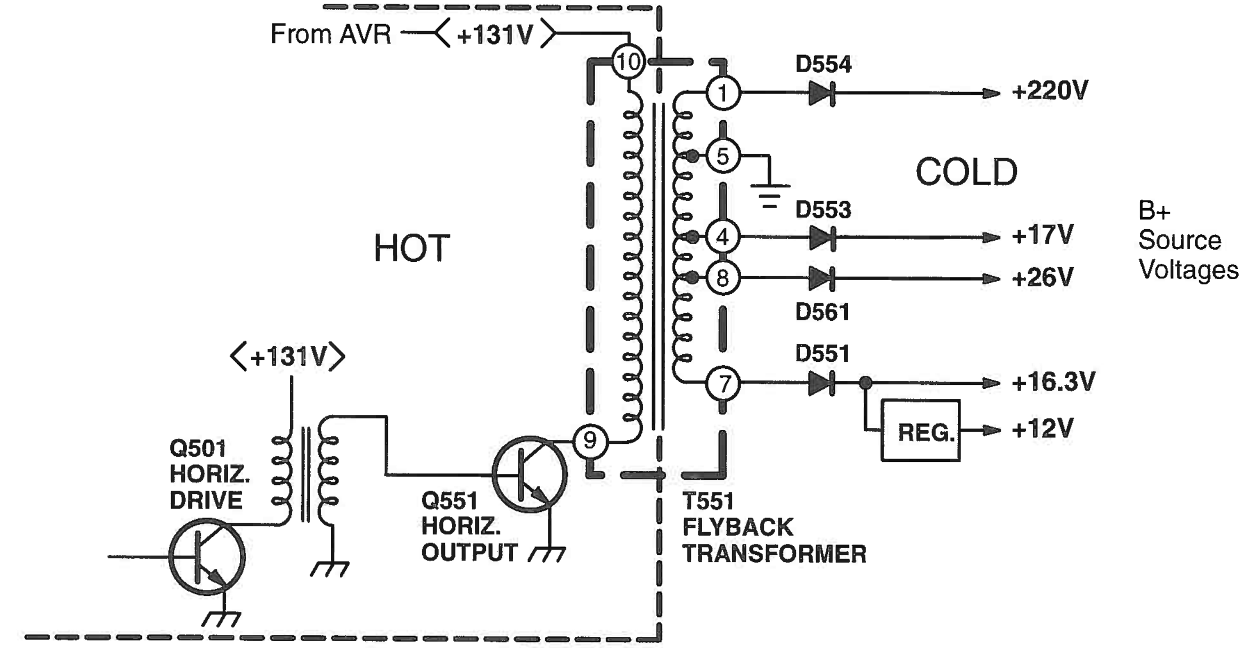
AVR Power Supply

B+ Source Voltages

The NA3A Chassis B+ source voltages are derived from secondary windings on the flyback transformer (T551).

B+ for the Horizontal Drive, Horizontal Output (Q501/Q551) and Flyback Transformer (T551) is supplied by an AVR (Automatic Voltage Regulator) 131 volt output. Since the secondary B+ voltages are dependant on scan waveform or flyback pulse amplitude, these voltages are also regulated for AC line and/or load variations.

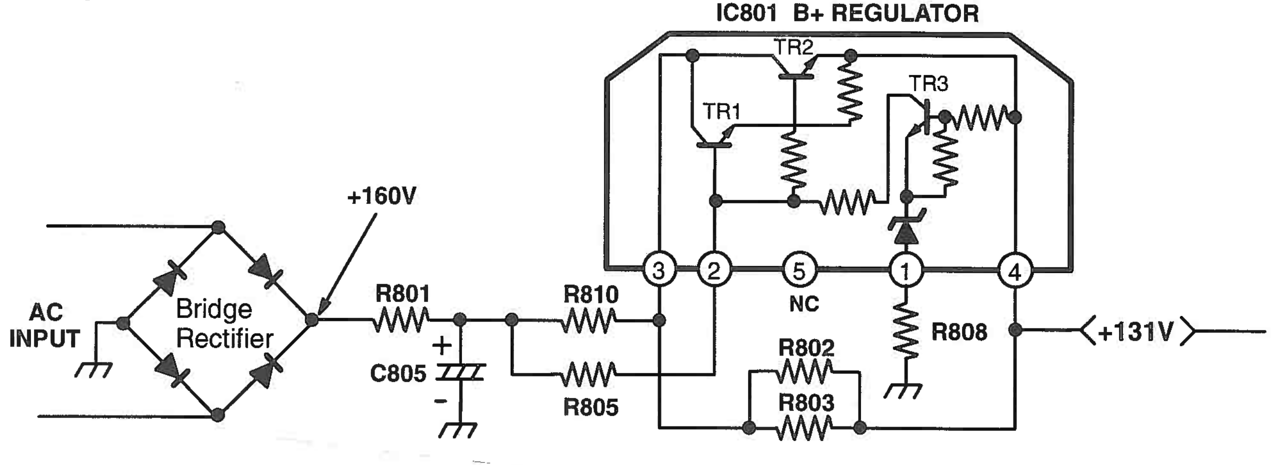
The +17 volt, +16.3 volt and +26 volt supplies are derived by diode rectification of the scan waveform and are relatively high current supplies. The 16.3 volt B+ source is also coupled to a 12 volt regulator. IC551 suppies +12 volt B+ to most of the Main Board circuitry. The +220 volt is developed from diode rectification of the flyback pulse.



Automatic Voltage Regulation

The AVR (IC801) detects the variations of its output and corrects any changes to +131 volts. +160 volts from the full wave bridge rectifier is applied to the collector of internal TR1 and TR2. (IC801 pin 3.) This voltage is also applied to the base of TR1 and TR2. (IC801 pin 2) The base voltage TR1, TR2 causes emitter current to flow and generate +131 volts output. (IC801 pin 4.)

If for some reason, output voltage increases, the base voltage of TR3 also increases. The collector voltage of TR3 decreases. The base voltage of TR1 and TR2 will decrease and the output voltage is reduced.



Follow the chart below to observe IC801 voltage regulation. ↗ = voltage increase, ↘ = voltage decrease.

Output Voltage Before Correction	TR3 Base	 Collector	TR1/TR2 Base	Output Voltage After Correction
HIGH	↗	↘	↘	+131V
Normal +131V				+131V
LOW	↘	↗	↗	+131V

Power Supply Protection*

A new feature has been added to the NA3/NA3A chassis family. MPU (IC001) Pin 19 is a dual function pin. The ACTION button function is activated when Pin 19 voltage is 0.588V or less. An Over Voltage Protect function is activated when Pin 19 voltage is 3.2V or higher.

With the Receiver on, the power supply B+ 16.5V is monitored and voltage divided by R088/R089. As long as the voltage at IC001 Pin 19 is 0.6V~3.1V (depending on power supply operation) the Receiver operates normally.

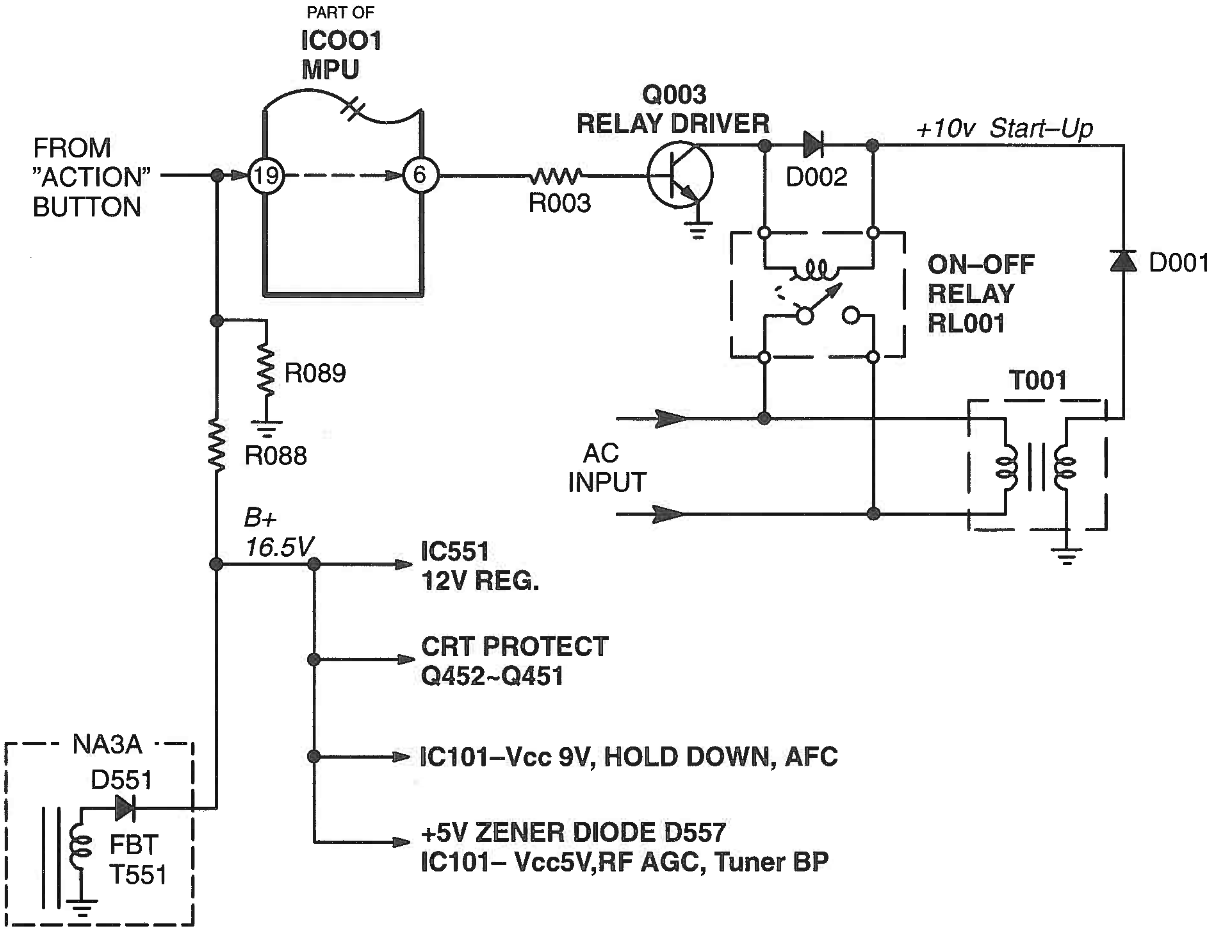
If a major power supply failure occurs, the power supply may far exceed the normal +16.5V ±2V specification. IC001 Pin 19 voltage will increase above 3.2V and internal circuitry of the IC will cause Pin 6 (power) to go low. When this happens, the base of Q003 is held low and it can not conduct. Relay RL001 deenergizes to open the on contact in the relay and shuts the Receiver off.

This condition will remain until AC power is momentarily disconnected.

If when pressing the power button after AC is applied again and the Receiver comes on but goes off after a few seconds, there is a problem in the Receiver's power supply.

WARNING: Because Pin 19 is a dual function pin, do not press the "ACTION" button on the Receiver. Pressing the button when the above symptom appears will inhibit the Overvoltage Protection and if the Receiver is powered on again, severe damage may happen to the entire chassis. If IC801 is changed to correct a power supply failure, also check or change D806, D807 and D808 before reapplying power to the chassis. During a major failure, these components can fail, causing the I.C. to appear to operate normally, but it may run very hot, leading to another I.C. failure very quickly.

* It may be noted that this overvoltage protection circuit is absolutely required in the NA3 chassis, due to the nature of the switching supply. It is virtually impossible for this kind of failure to occur in the NA3A chassis. This circuit is included because of the common use of the microprocessor in both chassis.



Horizontal Hold Down Circuit

This circuit protects against excessive high voltage and CRT beam current. If for any reason high voltage and/or CRT beam current exceeds a predetermined level, the Hold Down Circuit operates to increase horizontal frequency. If the level increases more, the Hold Down Circuit will blank the CRT.

CRT heater voltage from pin 6 of flyback transformer (FBT) T551 is rectified by diode D531. This voltage is directly proportional to high voltage variations. The voltage is filtered and divided down by precision resistors R532/R533 to approximately 2.4V and applied to Pin 49 (Hold Down) of IC101. With this voltage as a normal condition, the Hold Down Circuit is inactive and has no effect on horizontal frequency or blanking the CRT.

The Hold Down Circuit inside IC101 is a (NPN) differential amp. One base of the differential amp is connected to Pin 49 (approximately 2.4V). The other is connected to Pin 51 through an internal voltage divided of equal resistance. Pin 51 is clamped at a 6V DC reference voltage by zener diode D532. The voltage at the base of the differential amp is 3V. (1/2 of the reference voltage, 6V)

Basically, the Hold Down Circuit compares the voltage at Pin 49 (approximately 2.4V) to half of Pin 51 (clamped 6V). If CRT heater pulse amplitude from T551 (representative of high voltage) increases, the positive voltage at the cathode of D531 and at Pin 49 of IC101 also increase.

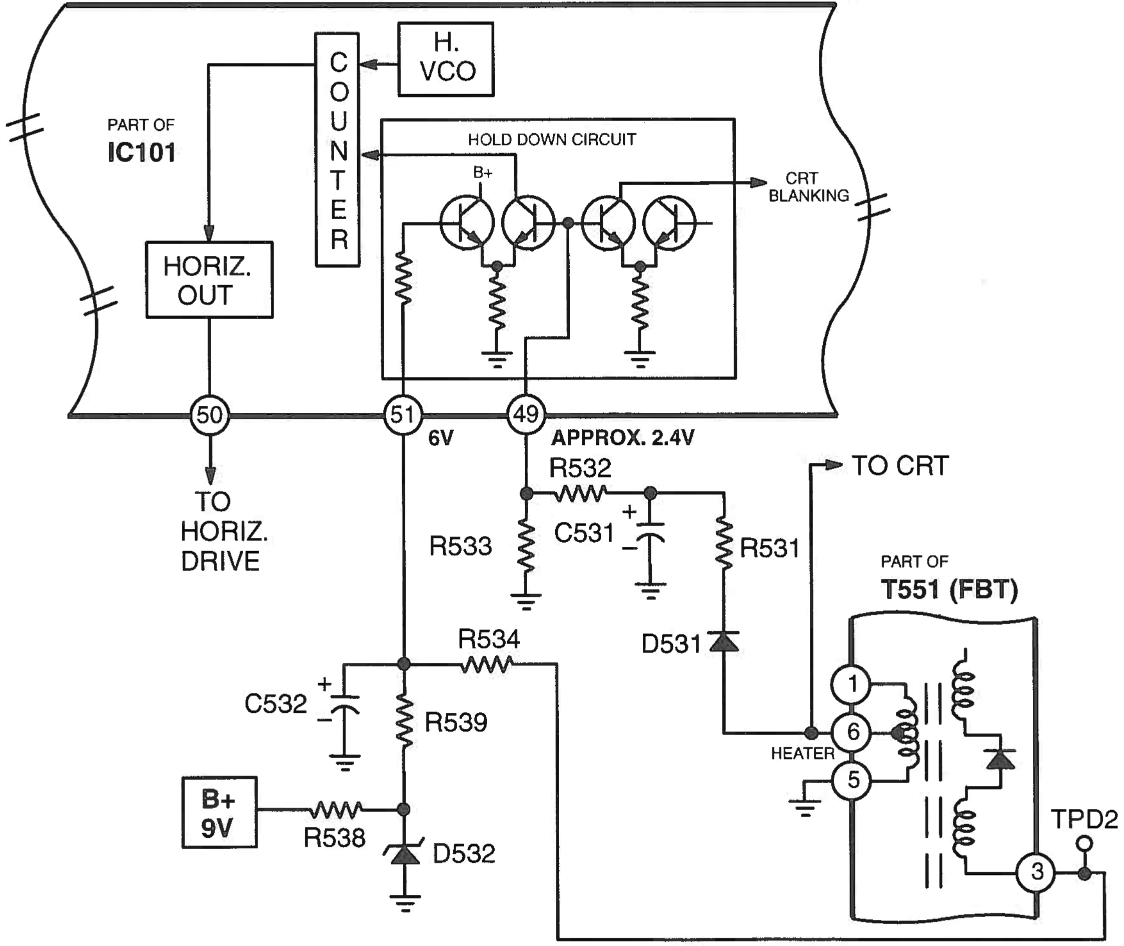
When the increased DC voltage at Pin 49 exceeds half of the Pin 51 reference voltage by a predetermined amount, the Hold Down Circuit (differential amp) changes conduction state and shifts the horizontal count down for a higher sweep frequency (out of sync condition) to prevent unsafe operation. For further safety when the Pin 49 voltage is extremely excessive, another internal differential amp changes state to blank the CRT.

An increase in CRT beam current produces more negative ABL voltage at Pin 3 of T551 (FBT) which is coupled to Pin 51 of IC101 via resistor R534. This increased negative voltage opposes the positive voltage at Pin 51 and lowers the DC reference voltage to less than 6V. This in turn causes the Hold Down Circuit to operate sooner when Pin 49 voltage increases.

Thus excessive levels of high voltage and/or increased CRT beam current cause determining of the horizontal oscillator frequency and eventual blanking of the CRT to assure operation within safe limits.

The B+ circuit and the Hold Down Circuit are not adjustable. If components in the designated areas of the schematic for critical parts are changed, operation of the Hold Down Circuit must be checked to insure that high voltage and CRT beam current does not exceed safe operation parameters. Check the following for possible failure:

1. Measure the DC voltage at Pin 49 of IC101 (reading should be close to +2.4V). If not, check D531, R531, C531, R532, R533 and IC101.
2. Measure the DC voltage at Pin 51 of IC101. (reading should be +6V) if not, check R534, C532, R539, D532, R538 and IC101.



CRT Protection Circuit

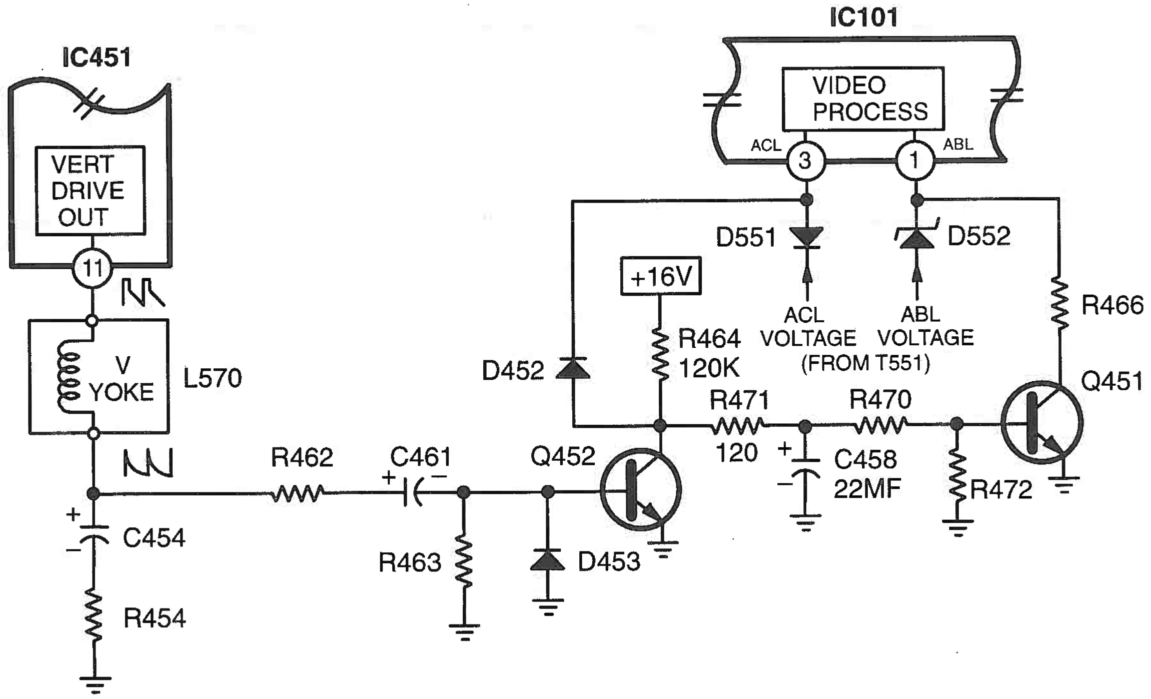
The CRT Protection Circuit is made up of transistors Q452 and Q451. The circuit blanks the CRT in the event of vertical sweep loss.

During normal operation, Q452 monitors vertical sweep by being connected to the low side of the vertical yoke L570. When Q452 is off, C458 starts to charge up from the 16V source through resistors R464 and R471. The RC time constant is such that the charging is slow. When Q452 is conducting, C458 discharges through R471 and the transistor to ground. The RC time constant is such that the discharge is fast. The slow charging and fast discharging along with voltage divider R470/R472 prevents sufficient bias for transistor Q451 to conduct. With Q451 not conducting, Pin 1 of IC101 is high and ABL functions normally.

If yoke current ceases (due to an open yoke or no voltage at IC451 Pin 11), there is no base bias for transistor Q452. The transistor is now always non conductive. Capacitor C458 is now allowed to charge a longer time to supply enough bias through voltage divider R470/R472 for Q451 to conduct. When it does, the voltage at Pin 1 of IC101 goes low and cuts off CRT beam current.

Diode D452 is added to the collector of Q452 to prevent the circuit from operation when Pin 3 of IC101 is grounded for Service Switch function when setting CRT cutoff.

It is important for CRT life that this circuit be checked before returning a repaired receiver to a customer. A quick test is to short Q452 base to ground. The CRT should blank. If not, troubleshoot the circuit for cause.



REPLACEMENT PARTS LIST

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

Ref. No.	Part No.	Description
		CAPRISTORS
CRA801	**EXNG131P365**	**RES–CAP 130PF/3.6 MEG**
		CAPACITORS
C001	ECKF1H103ZF	CAP,C .01UF–Z–50V
C002	ECEA1EU4R7	CAP,E 4.7UF/25V
C007	ECKF1H101KB	CAP,C 100PF–K–50V
C008	ECKF1H103ZF	CAP,C .01UF–Z–50V
C012	ECEA1HU3R3	CAP,E 3.3UF/50V
C013	ECKF1H103ZF	CAP,C .01UF–Z–50V
C014	ECEA0JU102	CAP,E 1000UF/6.3V
C017	ECEA0JU101	CAP,E 100UF/6.3V
C019	ECKF1H103ZF	CAP,C .01UF–Z–50V
C021	ECKF1H821KB	CAP,C 820PF–K–50V
C022	ECCF1H330JP	CAP,C 33PF–J–50V
C023	ECCF1H150JP	CAP,C 15PF–J–50V
C025	ECKF1H101KB	CAP,C 100PF–K–50V
C026	ECEA1CFS102	CAP,E 1000UF/16V
C028	ECEA1HU4R7	CAP,E 4.7UF/50V
C031	ECRHA020D41	TRIMMER: 20PF
C032	ECKF1H103ZF	CAP,C .01UF–Z–50V
C033	ECKF1H103ZF	CAP,C .01UF–Z–50V
C035	ECKF1H103ZF	CAP,C .01UF–Z–50V
C036	ECEA0JU101	CAP,E 100UF/6.3V
C037	ECEA0JU101	CAP,E 100UF/6.3V
C038	ECKF1H103ZF	CAP,C .01UF–Z–50V
C039	ECEA0JU101	CAP,E 100UF/6.3V
C045	ECEA1CU471	CAP,E 470UF/16V
C046	ECKF1H103ZF	CAP,C .01UF–Z–50V
C060	ECKF1H103ZF	CAP,C .01UF–Z–50V
C101	ECKF1H103ZF	CAP,C .01UF–Z–50V
C102	ECEA1CU100	CAP,E 10UF/16V
C103	ECKF1H103ZF	CAP,C .01UF–Z–50V
C104	ECEA1HUR22	CAP,E .22UF/50V
C105	ECCF1H270JC	CAP,C 27PF–J–50V
C106	ECKF1H122KB	CAP,C .0012UF–K–50V
C107	ECEA1HUR47	CAP,E .47UF/50V
C109	ECEA0JU101	CAP,E 100UF/6.3V
C110	ECKF1H103ZF	CAP,C .01UF–Z–50V
C113	ECEA1CU100	CAP,E 10UF/16V
C151	ECEA1HUR22	CAP,E .22UF/50V
C152	ECCF1H820JC	CAP,C 82PF–J–50V
C153	ECKF1H103ZF	CAP,C .01UF–Z–50V
C201	ECCF1H560JC	CAP,C 56PF–J–50V
C202	ECKF1H103ZF	CAP,C .01UF–Z–50V
C203	ECKF1H103ZF	CAP,C .01UF–Z–50V
C206	ECQB1H183KF	CAP,P .018UF–K–50V
C207	ECEA1CN100S	CAP,E 10UF/16V
C301	ECEA1CU100	CAP,E 10UF/16V
C302	ECEA1AU331	CAP,E 330UF/10V
C303	ECEA1EU4R7	CAP,E 4.7UF/25V
C304	ECEA1EU4R7	CAP,E 4.7UF/25V
C305	ECEA1HUR33	CAP,E .33UF/50V
C306	ECEA1HU010	CAP,E 1UF/50V
C309	ECEA1HN010S	CAP,E 1UF/50V
C310	ECEA1CU100	CAP,E 10UF/16V
C312	ECEA1CU220	CAP,E 22UF/16V
C313	ECCF1H390K	CAP,C 39PF–K–50V
C316	ECCF1H560K	CAP,C 56PF–J–50V
C321	ECEA1AN470S	CAP,E 47UF/10V
C322	ECQB1H473KF	CAP,P .047UF–K–50V
C323	ECQB1H103KF	CAP,P .01UF–K–50V
C324	ECQB1H103KF	CAP,P .01UF–K–50V
C325	ECKF1H103ZF	CAP,C .01UF–Z–50V
C351	ECKF1H331KB	CAP,C 330PF–K–50V
C352	ECKF1H221KB	CAP,C 220PF–K–50V CT–1384VY
———	ECKF1H271KB	CAP,C 270PF–K–50V CT–2084VYA CT–2084VY
C353	ECKF1H471KB	CAP,C 470PF–K–50V CT–2084VYA CT–2084VY
———	ECKF1H561KB	CAP,C 560PF–K–50V CT–1384VY
C354	ECEA1CU100	CAP,E 10UF/16V
C355	ECKD3D102KB	CAP,C .001UF–K–2KV CT–2084VYA CT–2084VY
———	ECKD3D681KB	CAP,C 680PF–K–2KV CT–1384VY
C356	ECEA1CU100	CAP,E 10UF/16V
C357	ECKF1H102KB	CAP,C .001UF–K–50V
C401	ECEA1HUR33	CAP,E .33UF/50V
C402	ECKF1H681KB	CAP,C 680PF–K–50V
C403	ECEA1HN010S	CAP,E 1UF/50V
C451	ECEA1CGE221	CAP,E 220UF/16V CT–2084VYA CT–2084VY
———	ECEA1CU101	CAP,E 100UF/16V CT–1384VY
C452	ECSF1EE105	CAP,T 1.0UF/25V
C453	ECEA25Z3R3	CAP,E 3.3UF/25V CT–1384VY
———	ECEA50Z2R2	CAP,E 2.2UF/50V CT–2084VYA CT–2084VY
C454	ECEA1CU222	CAP,E 2200UF/16V CT–1384VY
———	ECEA1EU102	CAP,E 1000UF/25V CT–2084VYA CT–2084VY
C455	ECEA1VU101	CAP,E 100UF/35V
C456	ECQB1H473KF	CAP,P .047UF–K–50V
C457	ECEA1HGE0R1	CAP,E .1UF/50V
C458	ECEA1EU4R7	CAP,E 4.7UF/25V
C461	ECEA1HU010	CAP,E 1UF/50V
C502	ECEA1HU010	CAP,E 1UF/50V
C503	ECQB1H333KF	CAP,P .033UF–K–50V
C504	ECKF1H103ZF	CAP,C .01UF–Z–50V
C505	ECQB1H103KF	CAP,P .01UF–K–50V CT–2084VYA CT–2084VY
———	ECQB1H223KF	CAP,P .022UF–K–50V CT–1384VY
C506	ECEA1AU221	CAP,E 220UF/10V
C507	ECKF1H221KB	CAP,C 220PF–K–50V
C508	ECQB1H223KF	CAP,P .022UF–K–50V
C509	ECCF1H221JU	CAP,C 220PF–J–50V
C510	ECCD2H100D	CAP,C 10PF–D–500V
C511	ECKD2H821KB	CAP,C 820PF–K–500V
C515	ECKD2H821KB	CAP,C 820PF–K–500V CT–2084VYA CT–2084VY
C531	**ECEA1EU330**	**CAP,E 33UF/25V**
C532	**ECEA1EU4R7**	**CAP,E 4.7UF/25V**
C541	ECCF1H121JC	CAP,C 120PF–J–50V CT–2084VYA CT–2084VY
———	ECCF1H221JP	CAP,C 220PF–J–50V CT–1384VY
C543	ECKF1H221KB	CAP,C 220PF–K–50V
C552	**ECEA1EU221**	**CAP,E 220UF/25V**
C554	**ECKD2H561KB**	**CAP,C 560PF–K–500V**
C555	**ECEA2EU100**	**CAP,E 10UF/250V** **CT–2084VYA CT–2084VY**
———	**ECEA2EU220**	**CAP,E 22UF/250V** **CT–1384VY**
C557	**ECEA1EFS330**	**CAP,E 33UF/25V**
C559	**ECEA1EFS221**	**CAP,E 220UF/25V**
C560	ECEA1EU220	CAP,E 22UF/25V
C561	ECEA1HU2R2	CAP,E 2.2UF/50V
C562	**ECKD2H561KB**	**CAP,C 560PF–K–500V**
C563	**ECWH12H562JS**	**CAP,P .0056UF–J–1.2KV** **CT–1384VY**
———	**ECWH12H822JS**	**CAP,P .0082UF–J–1.2KV** **CT–2084VYA CT–2084VY**
C564	**ECKD3D102JB**	**CAP,C .001UF–J–2KV** **CT–2084VYA CT–2084VY**
———	**ECKD3D681JB**	**CAP,C 680PF–J–2KV** **CT–1384VY**

REPLACEMENT PARTS LIST

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Ref. No.	Part No.	Description
C565	**ECKD3D221JB**	**CAP,C 220PF–J–2KV** **CT–2084VYA CT–2084VY**
———	**ECKD3D681JB**	**CAP,C 680PF–J–2KV** **CT–1384VY**
C566	**ECKD3D181JB**	**CAP,C 180PF–J–2KV**
C567	**ECEA1VGE102**	**CAP,E 1000UF/35V**
C569	**ECQF2H304JS**	**CAP,P .3UF–J–200V** **CT–1384VY**
———	**ECQF2H394JS**	**CAP,P .39UF–J–200V** **CT–2084VYA CT–2084VY**
C570	**ECKD2H561KB**	**CAP,C 560PF–K–500V**
C576	ECKF1H103ZF	CAP,C .01UF–Z–50V
C577	**ECKD2H102KB**	**CAP,C .001UF–K–500V** **CT–2084VYA CT–2084VY**
C601	ECCF1H101J	CAP,C 100PF–J–50V
C602	ECCF1H150JU	CAP,C 15PF–J–50V
C607	ECCF1H101J	CAP,C 100PF–J–50V
C801	**ECKD2H103PU**	**CAP,C .01UF–P–500V** **CT–1384VY**
———	**ECKD2H472PU**	**CAP,C .0047UF–P–500V** **CT–2084VYA CT–2084VY**
C803	**ECKD2H472PU**	**CAP,C .0047UF–P–500V** **CT–2084VYA CT–2084VY**
C804	**ECKD2H103PU**	**CAP,C .01UF–P–500V** **CT–1384VY**
———	**ECKD2H472PU**	**CAP,C .0047UF–P–500V** **CT–2084VYA CT–2084VY**
C805	**ECES2DU221E4**	**CAP,E 220UF/200V** **CT–1384VY**
———	**EC0S2DG331G4**	**CAP,E 330UF/200V** **CT–2084VYA CT–2084VY**
C806	**ECEA2CU220**	**CAP,E 22UF/160V**
C809	**ECQU1A224KH**	**CAP,P .22UF–K–125VAC**
C812	**ECEA160V33Z**	**CAP,E 33UF/160V**
C817	**ECQU1A153KH**	**CAP,P .015UF–K–125VAC**
C818	**ECQU1A153KH**	**CAP,P .015UF–K–125VAC**
C2301	ECQB1H104KF	CAP,P .1UF–K–50V
C2302	ECEA1CU220	CAP,E 22UF/16V
C2303	ECEA1HU010	CAP,E 1UF/50V
C2304	ECEA1HU2R2	CAP,E 2.2UF/50V
C2305	ECEA1EU102	CAP,E 1000UF/25V
C2306	ECEA1CGE100	CAP,E 10UF/16V
C2307	ECQB1H683KF	CAP,P .068UF–K–50V
C2308	ECKF1H182KB	CAP,C .0018UF–K–50V
C2309	ECEA1EU221	CAP,E 220UF/25V
C2315	ECEA1HN010S	CAP,E 1UF/50V
C3002	ECEA1CU470	CAP,E 47UF/16V
C3003	ECEA1CU100	CAP,E 10UF/16V
C3004	ECKF1H103ZF	CAP,C .01UF–Z–50V
C3005	ECKF1H103ZF	CAP,C .01UF–Z–50V
C3006	ECEA1CU100	CAP,E 10UF/16V
C3007	ECEA1CU100	CAP,E 10UF/16V
C3008	ECEA1HU010	CAP,E 1UF/50V
C3009	ECEA1HU010	CAP,E 1UF/50V
C3010	ECEA1HU010	CAP,E 1UF/50V
C3011	ECEA1HN010S	CAP,E 1UF/50V
C3016	ECEA1CU470	CAP,E 47UF/16V
C3019	ECEA1HN010S	CAP,E 1UF/50V
C3020	ECEA1CU471	CAP,E 470UF/16V
C3022	ECEA1CU101	CAP,E 100UF/16V
C3201	ECEA1AU220	CAP,E 22UF/10V
C3202	ECCF1H560JC	CAP,C 56PF–J–50V
C3206	ECEA1CU221	CAP,E 220UF/16V
C3207	ECEA1AU220	CAP,E 22UF/10V
C3208	ECKF1H103ZF	CAP,C .01UF–Z–50V
C3214	ECKF1H103ZF	CAP,C .01UF–Z–50V
C3215	ECKF1H103ZF	CAP,C .01UF–Z–50V
C3216	ECCF1H101J	CAP,C 100PF–J–50V
		DIODES
D001	ERA15–01	DIODE
D002	MA162	DIODE
D003	MA1047M	DIODE, ZENER
D006	MA165	DIODE
D022	MA150	DIODE
D025	MA150	DIODE
D029	MA165	DIODE
D030	MA165	DIODE
D031	MA165	DIODE
D351	MA165	DIODE
D352	MA4068M	DIODE, ZENER
D353	MA4068M	DIODE, ZENER
D451	ERA15–01	DIODE
D452	MA165	DIODE
D453	MA165	DIODE
D455	MA4120M	DIODE CT–1384VY
D501	TVSQA208C	DIODE, ZENER
D531	**AS01**	**DIODE**
D532	**TVSQA206M**	**DIODE, ZENER**
D542	MA4100M	DIODE, ZENER
D543	MA4051M	DIODE, ZENER CT–1384VY
———	MA4068M	DIODE, ZENER CT–2084VYA CT–2084VY
D551	**RU2N**	**DIODE**
D553	**AS01**	**DIODE**
D554	**AS01**	**DIODE**
D555	MA165	DIODE
D556	MA4360H	DIODE, ZENER
D557	TVSQB105N	DIODE, ZENER
D560	TVSQB109SA	DIODE, ZENER
D561	**AS01**	**DIODE**
D562	MA165	DIODE
D563	MA165	DIODE
D801	**EM02BM**	**DIODE**
D802	**EM02BM**	**DIODE**
D803	**EM02BM**	**DIODE**
D804	**EM02BM**	**DIODE**
D805	**TRPF5B0M050F**	**THERMISTOR**
D3001	MA4120	DIODE
D3002	MA4120	DIODE
D3003	MA4120	DIODE
D3004	MA165	DIODE
D3005	MA165	DIODE
D3006	MA165	DIODE
D3007	MA165	DIODE
D3253	MA4110	DIODE, ZENER
D3254	MA4110	DIODE, ZENER
		FUSES
F001	**XBA1C40NU100**	**FUSE 4.0A/125V**
		INTEGRATED CIRCUITS
IC001	MN1873234QAM	INT CKT
IC002	24C02AIP	INT CKT
IC003	MN1280R	INT CKT
IC101	**AN5163K**	**INT CKT**
IC451	LA7835–TV	INT CKT
IC551	**AN78M12**	**PLUS 12V AVR**
IC801	**TVSSTR30130**	**INT CKT**
IC2301	AN5265	INT CKT
IC3001	M52472P	INT CKT
IC3201	M52055P	INT CKT
		COILS
L003	EXCELSA39	FERRITE BEAD
L011	TLUABTA1R5K	COIL, PEAKING 1.5UH
L101	TLUABTA150K	COIL, PEAKING 15UH
L103	EIV7EN041B	COIL, AFT
L105	EIV7EN053B	VCO
L106	TLQ012K205C	COIL, PEAKING 1.2UH

REPLACEMENT PARTS LIST

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Ref. No.	Part No.	Description
L107	TLQ012K205C	COIL, PEAKING 1.2UH
L108	TLUABTA1R0K	COIL, PEAKING 1.0UH
L201	EIS7ES004B	COIL, QUADRATURE
L304	EIK1EG024B	DELAY LINE
L306	EFDEN645B35B	DELAY LINE
L351	TLUABTA151K	COIL, PEAKING 150UH
L551	**TLH15652P**	**COIL, LINEARITY**
		CT–2084VYA CT–2084VY
——	**TLH6622P**	**COIL, LINEARITY**
		CT–1384VY
L552	EXCELSA24	FERRITE BEAD
L553	EXCELSA24	FERRITE BEAD
L558	EXCELSA24	FERRITE BEAD
L570	**0LY15304F**	**YOKE, DEFLECTION**
		CT–1384VY
——	**0LY15309F**	**YOKE, DEFLECTION**
		CT–2084VYA CT–2084VY
L601	TLUABTA100K	COIL, PEAKING 10UH
L801	**ELF18D219**	**CHOKE, AC LINE**
		CT–1384VY
——	**TLP15578J**	**LINE FILTER CHOKE**
		CT–2084VYA CT–2084VY
L820	**TLK169093M**	**COIL, DEGAUSSING**
		CT–1384VY
——	**0LK19025M**	**COIL, DEGAUSSING**
		CT–2084VYA CT–2084VY
L3205	TLUABTA120K	COIL, PEAKING 12UH
L3207	ELEPH390JA	COIL, PEAKING 39UH
		TRANSISTORS
Q002	2SC1685QRS	TRANSISTOR
Q003	2SC1685QRS	TRANSISTOR
Q006	2SC1685QRS	TRANSISTOR
Q007	2SC1685QRS	TRANSISTOR
Q008	2SC1685QRS	TRANSISTOR
Q015	2SA564AQRS	TRANSISTOR
Q305	2SC1685QRS	TRANSISTOR
Q306	2SC1685QRS	TRANSISTOR
Q307	2SC1685QRS	TRANSISTOR
Q321	2SD637QR	TRANSISTOR
Q322	2SD637QR	TRANSISTOR
Q323	2SD637QR	TRANSISTOR
Q324	2SD637QR	TRANSISTOR
Q325	2SD637QR	TRANSISTOR
Q351	2SC1473NC	TRANSISTOR
		CT–1384VY
——	2SC3063	TRANSISTOR
		CT–2084VYA CT–2084VY
Q352	2SC1473NC	TRANSISTOR
		CT–1384VY
——	2SC3063	TRANSISTOR
		CT–2084VYA CT–2084VY
Q353	2SC1473NC	TRANSISTOR
		CT–1384VY
——	2SC3063	TRANSISTOR
		CT–2084VYA CT–2084VY
Q354	2SA564AQRS	TRANSISTOR
Q451	2SC1685QRS	TRANSISTOR
Q452	2SC1685QRS	TRANSISTOR
Q501	2SC1573AH	TRANSISTOR
Q541	2SC1685QRS	TRANSISTOR
Q551	**BU2506DF**	**TRANSISTOR**
Q2304	2SC1685QRS	TRANSISTOR
Q3004	2SD637QR	TRANSISTOR
Q3005	2SD637QR	TRANSISTOR
Q3216	2SD637RS	TRANSISTOR
		RELAYS
RL001	**TSE1864**	**RELAY**

Ref. No.	Part No.	Description
		RESISTORS
R002	ERDS2TJ103	RES,C 10K–J–1/4
R003	ERDS2TJ562	RES,C 5.6K–J–1/4
R004	ERDS1TJ181	RES,C 180–J–1/2
R005	ERDS2TJ101	RES,C 100–J–1/4
R007	ERDS2TJ102	RES,C 1K–J–1/4
R008	ERDS2TJ182	RES,C 1.8K–J–1/4
R013	ERDS2TJ473	RES,C 47K–J–1/4
R018	ERDS2TJ472	RES,C 4.7K–J–1/4
R019	ERDS2TJ472	RES,C 4.7K–J–1/4
R020	ERDS2TJ474	RES,C 470K–J–1/4
R021	ERDS2TJ101	RES,C 100–J–1/4
R022	ERDS2TJ101	RES,C 100–J–1/4
R023	ERD25TJ101	RES,C 100–J–1/4
R024	ERD25TJ101	RES,C 100–J–1/4
R025	ERD25TJ101	RES,C 100–J–1/4
R026	ERDS2TJ102	RES,C 1K–J–1/4
R030	ERDS2TJ683	RES,C 68K–J–1/4
R031	ERDS2TJ823	RES,C 82K–J–1/4
R035	ERDS2TJ331	RES,C 330–J–1/4
R037	ERDS2TJ562	RES,C 5.6K–J–1/4
R045	ERDS2TJ822	RES,C 8.2K–J–1/4
R050	ER0S2CKF1002	RES,M 10K–F–1/4
R055	ERDS2TJ820	RES,C 82–J–1/4
R056	ERDS2TJ102	RES,C 1K–J–1/4
R058	ERDS2TJ222	RES,C 2.2K–J–1/4
R059	ERDS2TJ222	RES,C 2.2K–J–1/4
R060	ERDS2TJ332	RES,C 3.3K–J–1/4
R061	ERDS2TJ512	RES,C 5.1K–J–1/4
R062	ERDS2TJ912	RES,C 9.1K–J–1/4
R063	ERDS2TJ223	RES,C 22K–J–1/4
R065	ERDS2TJ101	RES,C 100–J–1/4
R067	ERDS2TJ562	RES,C 5.6K–J–1/4
R071	ERDS2TJ101	RES,C 100–J–1/4
R072	ERD25TJ101	RES,C 100–J–1/4
R073	ERDS2TJ273	RES,C 27K–J–1/4
R074	ERG1ANJ683	RES,M 68K–J–1W
R076	ERDS2TJ273	RES,C 27K–J–1/4
R077	ERDS2TJ473	RES,C 47K–J–1/4
R078	ERD25TJ562	RES,C 5.6K–J–1/4
R085	ERDS2TJ184	RES,C 180K–J–1/4
R086	ERD25TJ334	RES,C 330K–J–1/4
R087	ERDS2TJ472	RES,C 4.7K–J–1/4
R088	ERDS2TJ223	RES,C 22K–J–1/4
R089	ERDS2TJ302	RES,C 3K–J–1/4
		CT–1384VY
——	ERDS2TJ392	RES,C 3.9K–J–1/4
		CT–2084VYA CT–2084VY
R091	ERDS2TJ272	RES,C 2.7K–J–1/4
R092	ERDS2TJ223	RES,C 22K–J–1/4
R093	ERDS2TJ103	RES,C 10K–J–1/4
R094	ERDS2TJ393	RES,C 39K–J–1/4
R097	ERD25TJ102	RES,C 1K–J–1/4
R102	ERDS2TJ393	RES,C 39K–J–1/4
R103	ERDS2TJ153	RES,C 15K–J–1/4
R104	ERDS2TJ121	RES,C 120–J–1/4
R105	ERDS2TJ102	RES,C 1K–J–1/4
R106	EVND1AA00B14	CONTROL 10K
R107	ERDS2TJ222	RES,C 2.2K–J–1/4
R111	ERDS2TJ361	RES,C 360–J–1/4
R112	ERDS2TJ561	RES,C 560–J–1/4
R152	ERDS2TJ154	RES,C 150K–J–1/4
R201	ERDS2TJ221	RES,C 220–J–1/4
R202	ERD25TJ682	RES,C 6.8K–J–1/4
R203	ERDS2TJ472	RES,C 4.7K–J–1/4
R206	ERQ1CJP220	RES,F 22–J–1W
R251	ERDS1TJ181	RES,C 180–J–1/2
		CT–1384VY
R304	ERDS2TJ274	RES,C 270K–J–1/4
R305	ERDS2TJ102	RES,C 1K–J–1/4
R306	ERDS2TJ102	RES,C 1K–J–1/4
R307	ERDS2TJ103	RES,C 10K–J–1/4
R313	ERDS2TJ562	RES,C 5.6K–J–1/4

REPLACEMENT PARTS LIST

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Ref. No.	Part No.	Description
R315	ERDS2TJ123	RES,C 12K–J–1/4
R317	ERDS2TJ132	RES,C 1.3K–J–1/4 CT–2084VYA CT–2084VY
——	ERDS2TJ152	RES,C 1.5K–J–1/4 CT–1384VY
R318	ERDS2TJ681	RES,C 680–J–1/4
R319	ERDS2TJ182	RES,C 1.8K–J–1/4
R322	ERDS2TJ682	RES,C 6.8K–J–1/4
R324	ERDS2TJ561	RES,C 560–J–1/4
R326	ERDS2TJ221	RES,C 220–J–1/4
R327	ERDS2TJ682	RES,C 6.8K–J–1/4
R328	ERDS2TJ332	RES,C 3.3K–J–1/4
R329	ERDS2TJ101	RES,C 100–J–1/4
R330	ERDS2TJ103	RES,C 10K–J–1/4
R331	ERDS2TJ102	RES,C 1K–J–1/4
R332	ERDS2TJ331	RES,C 330–J–1/4
R333	ERDS2TJ102	RES,C 1K–J–1/4
R334	ERDS2TJ101	RES,C 100–J–1/4
R335	EVN60AA00B22	CONTROL 200 OHM
R336	ERDS2TJ102	RES,C 1K–J–1/4
R337	ERDS2TJ272	RES,C 2.7K–J–1/4
R338	ERDS2TJ331	RES,C 330–J–1/4
R339	ERDS2TJ514	RES,C 51OK–J–1/4
R340	ERDS2TJ103	RES,C 10K–J–1/4
R341	ERDS2TJ102	RES,C 1K–J–1/4
R342	ERDS2TJ103	RES,C 10K–J–1/4
R343	ERDS2TJ822	RES,C 8.2K–J–1/4
R344	ERDS2TJ152	RES,C 1.5K–J–1/4
R345	ERDS2TJ271	RES,C 270–J–1/4
R346	ERDS2TJ821	RES,C 820–J–1/4
R347	ERDS2TJ392	RES,C 3.9K–J–1/4
R351	ERG1ANJ123	RES,M 12K–J–1W CT–1384VY
——	ERG2ANJ123	RES,M 12K–J–2W CT–2084VYA CT–2084VY
R352	ERG1ANJ123	RES,M 12K–J–1W CT–1384VY
——	ERG2ANJ123	RES,M 12K–J–2W CT–2084VYA CT–2084VY
R353	ERG2ANJ123	RES,M 12K–J–2W CT–2084VYA CT–2084VY
R354	ERDS1TJ272	RES,C 2.7K–J–1/2 CT–2084VYA CT–2084VY
R355	ERDS1TJ272	RES,C 2.7K–J–1/2 CT–2084VYA CT–2084VY
R356	ERDS1TJ272	RES,C 2.7K–J–1/2 CT–2084VYA CT–2084VY
R357	ERDS2TJ271	RES,C 270–J–1/4 CT–2084VYA CT–2084VY
——	ERDS2TJ331	RES,C 330–J–1/4 CT–1384VY
R358	ERDS2TJ271	RES,C 270–J–1/4 CT–2084VYA CT–2084VY
——	ERDS2TJ331	RES,C 330–J–1/4 CT–1384VY
R359	ERDS2TJ271	RES,C 270–J–1/4 CT–2084VYA CT–2084VY
——	ERDS2TJ331	RES,C 330–J–1/4 CT–1384VY
R360	ERDS2TJ241	RES,C 240–J–1/4 CT–1384VY
——	ERDS2TJ271	RES,C 270–J–1/4 CT–2084VYA CT–2084VY
R361	ERDS2TJ103	RES,C 10K–J–1/4 CT–2084VYA CT–2084VY
——	ERDS2TJ243	RES,C 24K–J–1/4 CT–1384VY
R362	ERDS2TJ561	RES,C 560–J–1/4 CT–1384VY
——	ERDS2TJ821	RES,C 820–J–1/4 CT–2084VYA CT–2084VY
R364	ERD25TJ101	RES,C 100–J–1/4
R365	ERDS2TJ101	RES,C 100–J–1/4
R366	ERDS2TJ101	RES,C 100–J–1/4
R369	ERG1ANJ123	RES,M 12K–J–1W CT–1384VY
R374	ERDS1TJ272	RES,C 2.7K–J–1/2 CT–1384VY
R375	ERDS1TJ272	RES,C 2.7K–J–1/2 CT–1384VY
R376	ERDS1TJ272	RES,C 2.7K–J–1/2 CT–1384VY
R401	ERDS2TJ224	RES,C 220K–J–1/4
R402	ERDS2TJ561	RES,C 560–J–1/4
R404	ERDS2TJ221	RES,C 220–J–1/4
R451	ERDS2TJ122	RES,C 1.2K–J–1/4 CT–2084VYA CT–2084VY
——	ERDS2TJ222	RES,C 2.2K–J–1/4 CT–1384VY
R452	ERDS2TJ223	RES,C 22K–J–1/4 CT–1384VY
——	ERDS2TJ333	RES,C 33K–J–1/4 CT–2084VYA CT–2084VY
R453	EVND1AA00B34	CONTROL 30K CT–2084VYA CT–2084VY
——	EVND2AA03B54	CONTROL 50K CT–1384VY
R454	ERDS1FJ1R8	RES,C 1.8–J–1/2
R455	ERDS2TJ183	RES,C 18K–J–1/4
R456	ERDS2TJ392	RES,C 3.9K–J–1/4 CT–2084VYA CT–2084VY
——	ERDS2TJ682	RES,C 6.8K–J–1/4 CT–1384VY
R457	ERDS2TJ122	RES,C 1.2K–J–1/4 CT–2084VYA CT–2084VY
——	ERDS2TJ681	RES,C 680–J–1/4 CT–1384VY
R458	ERDS2TJ223	RES,C 22K–J–1/4 CT–2084VYA CT–2084VY
——	ERDS2TJ822	RES,C 8.2K–J–1/4 CT–1384VY
R459	ERDS2TJ102	RES,C 1K–J–1/4
R460	ERDS2TJ223	RES,C 22K–J–1/4 CT–2084VYA CT–2084VY
R462	ERDS2TJ333	RES,C 33K–J–1/4 CT–1384VY
——	ERDS2TJ473	RES,C 47K–J–1/4 CT–2084VYA CT–2084VY
R463	ERDS2TJ224	RES,C 220K–J–1/4 CT–2084VYA CT–2084VY
——	ERDS2TJ684	RES,C 680K–J–1/4 CT–1384VY
R464	ERDS2TJ124	RES,C 120K–J–1/4
R466	ERDS2TJ101	RES,C 100–J–1/4
R467	ERDS2TJ102	RES,C 1K–J–1/4
R470	ERDS2TJ153	RES,C 15K–J–1/4
R471	ERDS2TJ271	RES,C 270–J–1/4
R472	ERDS2TJ103	RES,C 10K–J–1/4
R501	ERDS2TJ102	RES,C 1K–J–1/4
R502	ERDS2TJ222	RES,C 2.2K–J–1/4
R503	ERDS2TJ182	RES,C 1.8K–J–1/4 CT–1384VY
——	ERDS2TJ332	RES,C 3.3K–J–1/4 CT–2084VYA CT–2084VY
R504	ERDS2TJ821	RES,C 820–J–1/4
R505	ERDS2TJ472	RES,C 4.7K–J–1/4
R506	ERDS2TJ560	RES,C 56–J–1/4 CT–1384VY
——	ERDS2TJ680	RES,C 68–J–1/4 CT–2084VYA CT–2084VY
R507	ERDS2TJ562	RES,C 5.6K–J–1/4
R508	ERDS2TJ822	RES,C 8.2K–J–1/4
R509	ERG2ANJ182	RES,M 1.8K–J–2W CT–1384VY
——	ERG2ANJ562	RES,M 5.6K–J–2W CT–2084VYA CT–2084VY

REPLACEMENT PARTS LIST

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Ref. No.	Part No.	Description
R510	**ERG2ANJ332**	**RES,M 3.3K–J–2W** **CT–1384VY**
——	**ERG2ANJ362**	**RES,M 3.6K–J–2W** **CT–2084VYA CT–2084VY**
R511	**ERG2ANJ332**	**RES,M 3.3K–J–2W** **CT–1384VY**
——	**ERG2ANJ362**	**RES,M 3.6K–J–2W** **CT–2084VYA CT–2084VY**
R512	ERDS2TJ392	RES,C 3.9K–J–1/4 CT–1384VY
R516	ERDS2TJ391	RES,C 390–J–1/4
R517	ERD25TJ224	RES,C 220K–J–1/4
R531	**ERD25FJ470**	**RES,C 47–J–1/4**
R532	**ER025CKF4322**	**RES,M 43.2K–F–1/4** **CT–2084VYA CT–2084VY**
——	**ER025CKF4532**	**RES,M 45.3K–F–1/4** **CT–1384VY**
R533	**ER0S2CKF7151**	**RES,M 7.15K–F–1/4**
R534	**ERD25TJ684**	**RES,C 680K–J–1/4**
R538	**ERDS2TJ821**	**RES,C 820–J–1/4**
R539	**ERDS2TJ681**	**RES,C 680–J–1/4**
R541	ERDS2TJ562	RES,C 5.6K–J–1/4 CT–2084VYA CT–2084VY
——	ERDS2TJ682	RES,C 6.8K–J–1/4 CT–1384VY
R542	ERDS2TJ121	RES,C 120–J–1/4
R544	ERDS2TJ182	RES,C 1.8K–J–1/4
R547	ERD25TJ561	RES,C 560–J–1/4
R551	ERDS1FJ1R0	RES,C 1.0–J–1/2
R552	ERDS1FJ1R0	RES,C 1.0–J–1/2
R553	ERDS1FJ1R0	RES,C 1.0–J–1/2
R554	ERDS2TJ104	RES,C 100K–J–1/4 CT–2084VYA CT–2084VY
——	ERDS2TJ184	RES,C 180K–J–1/4 CT–1384VY
R555	ERDS2TJ154	RES,C 150K–J–1/4 CT–1384VY
——	ERDS2TJ823	RES,C 82K–J–1/4 CT–2084VYA CT–2084VY
R556	ERDS2TJ272	RES,C 2.7K–J–1/4 CT–2084VYA CT–2084VY
——	ERDS2TJ472	RES,C 4.7K–J–1/4 CT–1384VY
R557	ERDS2TJ103	RES,C 10K–J–1/4
R558	**ERQ1CJP1R0**	**RES,F 1.0–J–1W** **CT–2084VYA CT–2084VY**
——	**ERQ1CJP1R2**	**RES,F 1.2–J–1W** **CT–1384VY**
R559	ERG3ANJ820	RES,M 82–J–3W
R560	ERG2ANJ101	RES,M 100–J–2W CT–1384VY
——	ERG2ANJ680	RES,M 68–J–2W CT–2084VYA CT–2084VY
R562	ERG2ANJ122	RES,M 1.2K–J–2W
R563	ERDS1TJ681	RES,C 680–J–1/2
R566	**ERDS2TJ221**	**RES,C 220–J–1/4** **CT–2084VYA CT–2084VY**
R601	ERDS2TJ332	RES,C 3.3K–J–1/4
R602	ERD25TJ182	RES,C 1.8K–J–1/4
R603	ERDS2TJ331	RES,C 330–J–1/4
R604	ERDS2TJ331	RES,C 330–J–1/4
R605	ERDS2TJ331	RES,C 330–J–1/4
R606	ERDS2TJ331	RES,C 330–J–1/4
R607	ERD25TJ182	RES,C 1.8K–J–1/4 CT–1384VY
——	ERD25TJ222	RES,C 2.2K–J–1/4 CT–2084VYA CT–2084VY
R608	ERD25TJ182	RES,C 1.8K–J–1/4 CT–1384VY
——	ERD25TJ222	RES,C 2.2K–J–1/4 CT–2084VYA CT–2084VY
R609	ERD25TJ182	RES,C 1.8K–J–1/4 CT–1384VY
——	ERD25TJ222	RES,C 2.2K–J–1/4 CT–2084VYA CT–2084VY
R610	ERDS2TJ182	RES,C 1.8K–J–1/4
R611	ERDS2TJ681	RES,C 680–J–1/4
R612	ERDS2TJ681	RES,C 680–J–1/4
R613	ERDS2TJ681	RES,C 680–J–1/4
R614	ERD25TJ222	RES,C 2.2K–J–1/4
R615	ERDS2TJ103	RES,C 10K–J–1/4
R616	ERDS2TJ103	RES,C 10K–J–1/4
R617	ERDS2TJ103	RES,C 10K–J–1/4
R618	ERDS2TJ392	RES,C 3.9K–J–1/4
R619	ERDS2TJ331	RES,C 330–J–1/4
R801	**ERF7ZKR82**	**RES,W .82–K–7W**
R802	**ERF20ZJ181**	**RES,W 180–J–20W** **CT–2084VYA CT–2084VY**
——	**ERF20ZJ221**	**RES,W 220–J–20W** **CT–1384VY**
R803	**ERF5ZJ681**	**RES,W 680–J–5W** **CT–2084VYA CT–2084VY**
R804	**ERDS2TJ224**	**RES,C 220K–J–1/4**
R805	**ERDS1FJ103**	**RES,C 10K–J–1/2**
R807	**ERD25FJ470**	**RES,C 47–J–1/4**
R808	**ERD25FJ330**	**RES,C 33–J–1/4**
R810	**ERF5ZK5R6**	**RES,W 5.6–K–5W**
R811	**ERX3ANJP4R7**	**RES,M 4.7–J–3W** **CT–2084VYA CT–2084VY**
R815	**ERC12ZGM825**	**RES,S 8.2MEG–M–1/2**
R816	**ERW12PK1R0**	**RES,W 1.0–K–1/2**
R2302	ERDS2TJ823	RES,C 82K–J–1/4
R2303	ERDS2TJ331	RES,C 330–J–1/4
R2304	ERDS2TJ102	RES,C 1K–J–1/4 CT–2084VYA CT–2084VY
——	ERDS2TJ222	RES,C 2.2K–J–1/4 CT–1384VY
R2305	ERD25FJ4R7	RES,C 4.7–J–1/4
R2306	ERDS2TJ183	RES,C 18K–J–1/4
R2335	ERDS2TJ223	RES,C 22K–J–1/4
R2340	ERD25TJ473	RES,C 47K–J–1/4
R3001	ERDS2TJ102	RES,C 1K–J–1/4
R3002	ERDS2TJ102	RES,C 1K–J–1/4
R3003	ERDS2TJ102	RES,C 1K–J–1/4
R3005	ERDS2TJ102	RES,C 1K–J–1/4
R3006	ERDS2TJ562	RES,C 5.6K–J–1/4
R3008	ERDS2TJ123	RES,C 12K–J–1/4
R3009	ERDS2TJ103	RES,C 10K–J–1/4
R3013	ERDS2TJ223	RES,C 22K–J–1/4
R3014	ERDS2TJ183	RES,C 18K–J–1/4
R3018	ERDS2TJ223	RES,C 22K–J–1/4
R3019	ERDS2TJ183	RES,C 18K–J–1/4
R3023	ERDS2TJ223	RES,C 22K–J–1/4
R3024	ERDS2TJ183	RES,C 18K–J–1/4
R3027	ERDS2TJ473	RES,C 47K–J–1/4
R3032	ERDS2TJ102	RES,C 1K–J–1/4
R3037	ERDS2TJ221	RES,C 220–J–1/4
R3038	ERDS2TJ221	RES,C 220–J–1/4
R3040	ERDS2TJ473	RES,C 47K–J–1/4
R3041	ERDS2TJ750	RES,C 75–J–1/4
R3049	ERDS2TJ221	RES,C 220–J–1/4
R3050	ERDS2TJ102	RES,C 1K–J–1/4
R3051	ERDS2TJ623	RES,C 62K–J–1/4
R3052	ERDS2TJ104	RES,C 100K–J–1/4
R3053	ERDS2TJ472	RES,C 4.7K–J–1/4
R3060	ERDS2TJ273	RES,C 27K–J–1/4
R3066	ERDS2TJ104	RES,C 100K–J–1/4
R3069	ERDS2TJ104	RES,C 100K–J–1/4
R3070	ERD25TJ750	RES,C 75–J–1/4
R3071	ERD25TJ750	RES,C 75–J–1/4
R3072	ERD25TJ750	RES,C 75–J–1/4
R3201	ERD25TJ750	RES,C 75–J–1/4
R3202	ERD25TJ750	RES,C 75–J–1/4
R3203	ERDS2TJ101	RES,C 100–J–1/4

REPLACEMENT PARTS LIST

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Ref. No.	Part No.	Description
R3211	ERDS2TJ101	RES,C 100–J–1/4
R3212	ERDS2TJ471	RES,C 470–J–1/4
R3216	ERDS2TJ472	RES,C 4.7K–J–1/4
R3217	ERDS2TJ472	RES,C 4.7K–J–1/4
R3220	ERDS2TJ101	RES,C 100–J–1/4
R3221	ERDS2TJ123	RES,C 12K–J–1/4
R3270	ERDS2TJ222	RES,C 2.2K–J–1/4
R3271	ERDS2TJ221	RES,C 220–J–1/4
		SWITCHES
S001	EVQQBH12T	SWITCH, PUSH CT–2084VYA CT–2084VY
——	EVQQKH06K	SWITCH CT–1384VY
S002	EVQQBH12T	SWITCH, PUSH CT–2084VYA CT–2084VY
——	EVQQKH06K	SWITCH CT–1384VY
S003	EVQQBH12T	SWITCH, PUSH CT–2084VYA CT–2084VY
——	EVQQKH06K	SWITCH CT–1384VY
S004	EVQQBH12T	SWITCH, PUSH CT–2084VYA CT–2084VY
——	EVQQKH06K	SWITCH CT–1384VY
S005	EVQQBH12T	SWITCH, PUSH CT–2084VYA CT–2084VY
——	EVQQKH06K	SWITCH CT–1384VY
S006	EVQQBH12T	SWITCH, PUSH
S007	EVQQBH12T	SWITCH, PUSH
		TRANSFORMERS
T001	**TLP16297**	**TRANSFORMER, POWER SUPPLY**
T501	**ETH19Y70AYM**	**TRANSFORMER, HORIZ0NTAL DRIVER** **CT–2084VYA CT–2084VY**
——	**TLH15412**	**TRANSFORMER, HORIZONTAL DRIVER** **CT–1384VY**
T502	**ETE19Z30AY**	**TRANSFORMER, HORIZONTAL COUPLING**
T551	**TLF15615F**	**TRANSFORMER, FLYBACK** **CT–2084VYA CT–2084VY**
——	**0LF04701F**	**TRANSFORMER, FLYBACK** **CT–1384VY**
		CRYSTALS/FILTERS
X001	TSS2080MX	CRYSTAL
X101	EFCH45MVK12N	SAW FILTER
X102	EFCS4R5MW3BA	4.5MHZ TRAP
X201	EFCS4R5MS4	FILTER 4.5MHZ BANDPASS
X501	EF0A503KS41	CRYSTAL, OSCILLATOR
X601	TS816M32	CRYSTAL 3.58MHZ OSCILLATOR
		OTHERS
M001	**A51JXS61X**	**CRT 20"** **CT–2084VYA CT–2084VY**
M002	EAS12D129AG	SPEAKER, 4–3/4" X 2" 16 OHM CT–2084VYA CT–2084VY
M003	EAS65P40A–M	SPEAKER, 2–1/2" 16 OHM CT–1384VY
M004	**ENV568C6G3**	**U/V TUNER**
M005	EUR501050	TRANSMITTER, REMOTE CONTROL
M006	TBM153010–3	BADGE, PANASONIC CT–2084VYA CT–2084VY

Ref. No.	Part No.	Description
M007	TBM173027	BADGE, PANASONIC CT–1384VY
M008	TBM2A20405	OVERLAY: RIGHT CT–1384VY
M009	TBM2A20708	OVERLAY: RIGHT CT–2084VYA CT–2084VY
M010	TBM2A22108–1	OVERLAY: "ACTION/TV VIDEO" CT–2084VYA CT–2084VY
M011	TBM2A22308	OVERLAY: "ACTION/TV VIDEO" CT–1384VY
M012	TBM2A22504–1	OVERLAY: CHNL/PWR/VOL CT–2084VYA CT–2084VY
M013	TBX1886503G	ASSY. 5 PUSHBUTTON CT–1384VY
M014	TEK6935	DOOR, CATCH
M015	TES2A20305	SPRING, DAG GROUND CT–1384VY
M016	TES2A20801	SPRING, DAG GROUND CT–2084VYA CT–2084VY
M017	TJB1724601M	ASSY. 1RF ANTENNA: COMPLETE
M018	TJC6320	FUSE HOLDER
M019	TJS1A5050	CRT SOCKET CT–2084VYA CT–2084VY
M020	TJS1A5150	CRT SOCKET CT–1384VY
M021	TJS1A7010	JACK, EARPHONE CT–1384VY
M022	TKP1757364	GRILLE, SPEAKER CT–2084VYA CT–2084VY
M023	TKP1812174	OVERLAY: LEFT SIDE CT–2084VYA CT–2084VY
M024	TKP1812345	OVERLAY: CHNL/PWR/VOL CT–1384VY
M025	TKP2A10894M	DOOR, CONTROL CT–2084VYA CT–2084VY
M026	TKR27563	TRIM, DECORATIVE: BLACK; RIGHT CT–1384VY
M027	TKR27573	TRIM, DECORATIVE: BLACK; LEFT CT–1384VY
M028	TKR27583	TRIM, DECORATIVE: CONTROL DOOR CT–1384VY
M029	TKR27590	TRIM, DECORATIVE: BLACK; 25MM CT–1384VY
M030	TLC2042–3	MAGNET RINGS: PURITY & STATIC CONV. CT–1384VY
M031	TLC2047–2	MAGNET RINGS: PURITY & STATIC CONV. CT–2084VYA CT–2084VY
M032	TMM2A30202	WEDGE, DEFLECTION YOKE
M033	TMM27524	PAD, RUBBER: CRT MTG. CT–2084VYA CT–2084VY
M034	TQB2A0787	MANUAL, OWNERS': ENGLISH
M035	TQB2A0807	MANUAL, OWNERS': FRENCH & SPANISH CT–2084VYA
M036	TXFKP060SER	ASSY. CONTROL DOOR CT–1384VY
M037	TXFKU0493SER	ASSY. CABINET BACK CT–2084VY
M038	TXFKU2193SER	ASSY. CABINET BACK CT–2084VYA
M039	TXFKU248SER	ASSY. CABINET BACK CT–1384VY
M040	TXFKY0693SER	ASSY. CABINET FRONT CT–2084VY
M041	TXFKY0793SER	ASSY. CABINET FRONT CT–1384VY
M042	TXFKY1193SER	ASSY. CABINET FRONT CT–2084VYA

REPLACEMENT PARTS LIST

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Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
M043	TXF3A011DB2	ASSY. DAG GROUND CT–2084VYA CT–2084VY			
M044	TXF3A03TLR1	ASSY. DAG GROUND CT–1384VY			
M045	T8A262	SILICONE GREASE–HEAT SINK COMPOUND			
M046	UR50EC1027	BATTERY COVER: TRANSMITTER			
M047	0FMK014ZZ	CONVERGENCE CORRECTOR STRIP			
M048	0NQ1409	RECEIVER, REMOTE CONTROL			
M049	**0SX110204X**	**AC LINE CORD**			
M050	**37GDA85X(M)**	**CRT 13"** **CT–1384VY**			

ABBREVIATION OF PART NAME AND DESCRIPTION

RESISTOR

PART NAME & DESCRIPTION			
TYPE		ALLOWANCE	
C	Carbon	F	+/– 1%
F	Fuse	J	+/– 5%
M	Metal Oxide	K	+/– 10%
S	Solid	M	+/– 20%
W	Wire Wound	G	+/– 2%

Part No. **Description**

Example: ERD25TJ104 Ⓒ 100KΩ Ⓙ 1/4W

CAPACITOR

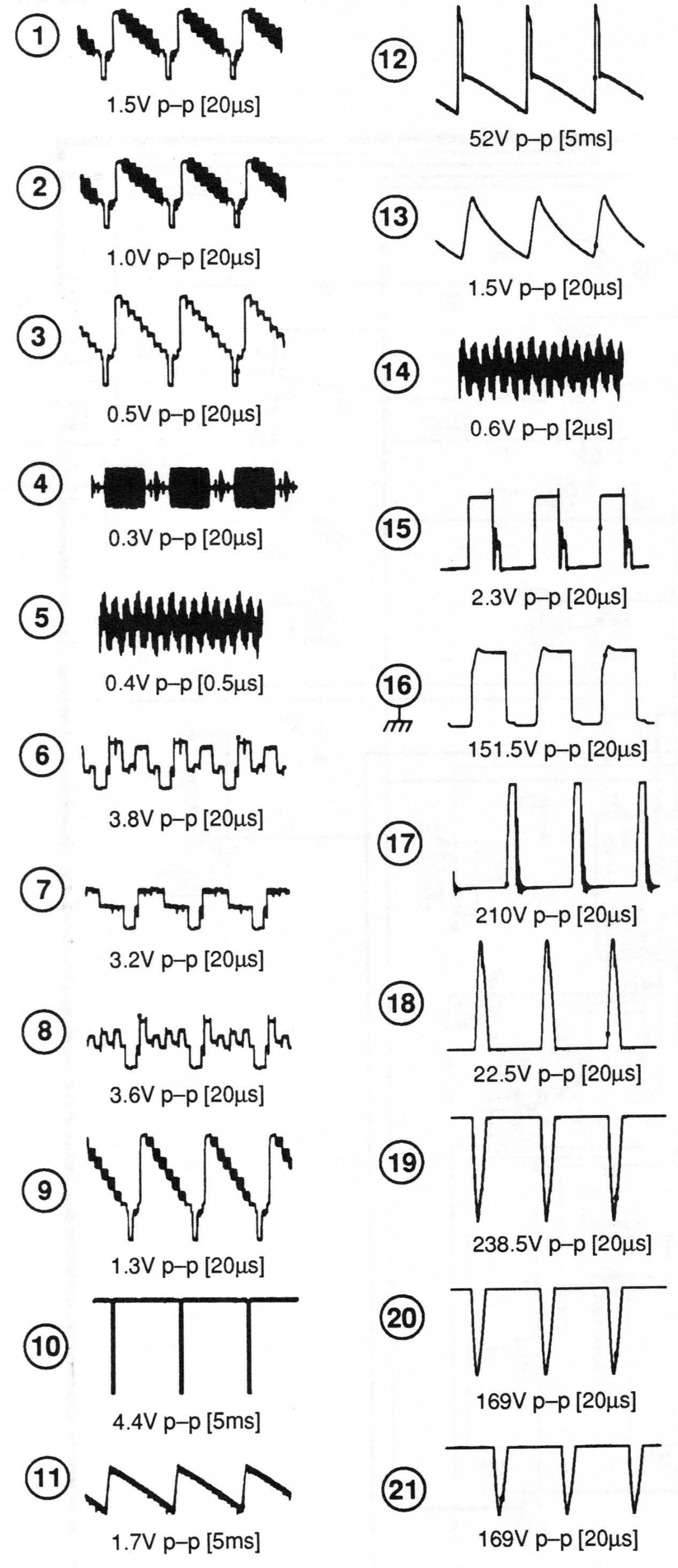
PART NAME & DESCRIPTION			
TYPE		ALLOWANCE	
C	Ceramic	C	+/– 0.25pF
E	Electrolytic	D	+/– 0.5pF
P	Polyester	F	+/– 1pF
S	Styrol	J	+/– 5%
T	Tantalum	K	+/– 10%
		L	+/– 15%
		M	+/– 20%
		P	+100% –0%
		Z	+80% –20%

Part No. **Description**

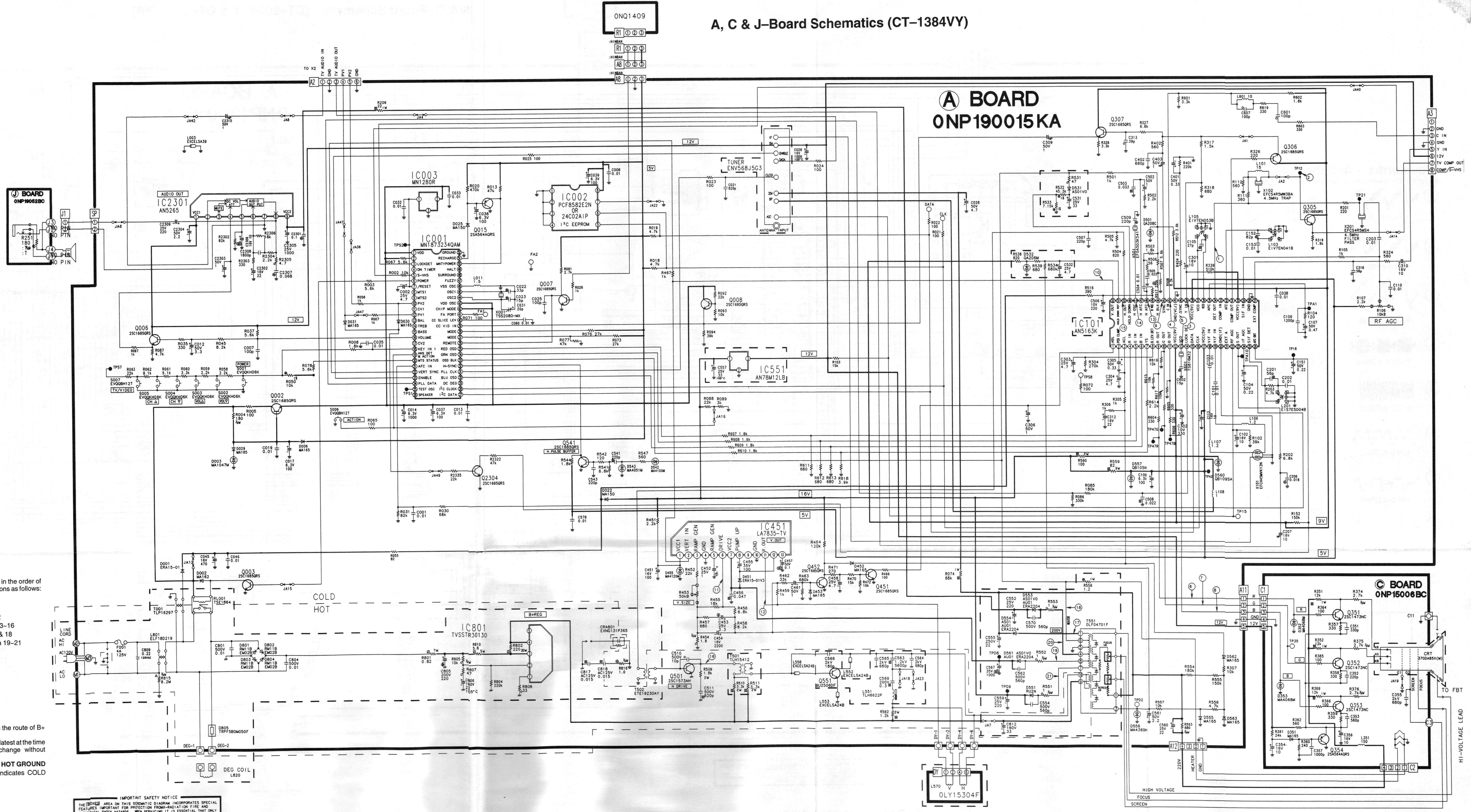
Example: ECKF1H103ZF Ⓒ 0.01µF Ⓩ 50V

Waveforms – A–Schematic

Waveform #16 is Hot Ground, the others are Cold Ground.



A, C & J–Board Schematics (CT–1384VY)



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Waveform Measurements

1. Taken with a NTSC signal generator connected to antenna terminal. (NTSC color bar pattern of 8 bars of EIA colors, 100 IRE white and 7.5 IRE black).
2. Customer Controls (Picture/Audio Menu) are set to Normalize. Volume "MIN".
3. All video and color waveforms taken with a wideband scope and a probe with low capacity (10 to 1). Shape and peak amplitudes may vary depending on type of Oscilloscope used and calibration.
4. Ground symbol ⏚ shown on waveform number indicates (Hot) ground lead connection of Oscilloscope
   CAUTION: Incorrect ground connection of test equipment will result in erroneous readings.

These waveforms have been taken in the order of circuit flow through the various sections as follows:

VIDEO – Waveforms 1~3
COLOR – Waveforms 4~8
VERTICAL – Waveforms 9~12
HORIZONTAL – Waveforms 13~16
CRT DRIVE – Waveforms 17 & 18
POWER SUPPLY – Waveform 19~21

Schematic Notes

1. Resistors are carbon 1/4W unless noted otherwise.
2. Capacitors are ceramic 50V unless noted otherwise.
3. Coil value noted is inductance in µH.
4. Test point indicated by ⚲ , Test point but no pin ⚲ .
5. When arrows [➔➔] used connections are easily found along with direction of arrow.
6. ▬ **(BOLD LINES)** Indicates the route of B+ supply.
7. This schematic diagram is the latest at the time of printing and subject to change without notice.
8. Ground symbol ⏚ indicates **HOT GROUND CONNECTION** and ⏚ indicates COLD GROUND CONNECTION.

Voltage Measurements

1. Voltage measurement:
   - AC input to Receiver is 120V. NTSC generator connected to antenna of Receiver.(color bar pattern of 100IRE white and 7.5 IRE black.)
   - All Picture and Audio adjustments set for Normalize.
     TV ANT/CABLE – (Set–Up Menu) in TV/ANT Mode
     Volume – Min
     TV/Video SW – TV position (when applies)
     Audio Mode – Stereo (when applies)
   - Voltage readings are nominal and may vary ±10% on active devices.
     Some voltage reading will vary with signal strength and picture content.
   - Supply voltages are all nominal.
2. Ground symbol ⏚ or ⏚ indicates ground lead connection of meter. **Caution: Incorrect ground connection will result in erroneous readings.**

The Functions listed below are activated by a DC voltage change to DAC Inputs (Pin 18 and 19) of MPU IC001. Press and hold a function button on Receiver to take voltage readings.

FUNCTION	**PIN 18**	**PIN 19**
POWER	0V~0.6V	0V(Set "OFF") 0.7V~3.0V (Set "ON")
VOL ◀	0.7V~1.2V	0.7V~3.0V
VOL ▶	1.3V~1.8V	0.7V~3.0V
CH ▼	1.9V~2.4V	0.7V~3.0V
CH ▲	2.6V~3.0V	0.7V~3.0V
ACTION	4.6V~5.0V	0V~0.6V

Voltage Chart – A–Board (CT–1384VY)

Integrated Circuits (ICs)

IC001

1	5.2	27	4.9
2	5.3	28	4.9
3	3.8	29	0
4	5.2	30	0
5	1.9	31	4.7
6	5.1	32	4.7
7	5.0	33	0
8	0.1	34	0
9	0.1	35	0
10	0.1	36	0
11	0.1	37	0
12	0	38	0
13	0.1	39	1.9
14	0.1	40	1.5
15	0.1	41	0
16	0.1	42	5.2
17	0	43	5.2
18	5.2	44	2.6
19	2.5	45	2.6
20	0	46	0
21	3.5	47	0
22	4.1	48	0
23	0.1	49	1.7
24	4.8	50	5.1
25	2.6	51	5.2
26	5.2	52	0

IC002

1	0
2	0
3	0
4	0
5	5.0
6	5.0
7	0
8	5.0

IC003

1	5.2
2	5.2
3	0

IC101

1	2.5	27	2.7
2	1.7	28	0
3	3.3	29	2.7
4	0	30	9.1
5	0	31	5.2
6	0	32	2.9
7	0	33	2.7
8	5.8	34	2.8
9	2.4	35	1.6
10	2.7	36	3.0
11	2.5	37	3.0
12	9.1	38	5.0
13	2.6	39	3.9
14	5.8	40	2.6
15	4.9	41	0
16	4.9	42	5.9
17	5.0	43	2.0
18	3.0	44	0.7
19	3.0	45	6.2
20	0	46	2.6
21	4.1	47	4.2
22	2.7	48	2.1
23	3.6	49	2.4
24	2.7	50	0.8
25	4.6	51	5.8
26	2.0	52	4.1

IC451

1	12.1
2	4.1
3	6.2
4	0
5	6.1
6	6.0
7	25.5
8	1.5
9	1.1
10	0
11	10.9
12	25.9
13	5.1

IC551

1	15.8
2	0
3	12.0

IC801 ⏚

1	0.2
2	131.6
3	152.5
4	130.6
5	NC

IC2301

1	12.1
2	5.4
3	0
4	0.2
5	7.9
6	8.1
7	0
8	8.3
9	18.4

Transistors

Ref.	b	c	e
Q002	5.9	10.4	5.0
Q003	0.7	0	0
Q006	0.3	12.1	0.2
Q007	0.6	0.1	0
Q008	1.6	5.2	1.6
Q015	5.2	0	5.2
Q305	1.6	9.1	1.1
Q306	5.2	9.1	4.5
Q307	4.5	9.1	3.9
Q451	0	2.2	0
⏚ Q452	0.1	0	0
Q501	0	101.4	0
⏚ Q541	0	4.7	0
Q551	0	133.8	0
Q2304	0	2.7	0

Voltage Chart – C–Board

Transistors

Ref.	b	c	e
Q351	2.4	135.9	2.0
Q352	2.5	131.2	2.1
Q353	2.5	131.7	2.1
Q354	0.3	0	1.0

Tuner Voltage Chart

Enable, Data, and Clock have no DC readings. They are digital signals from the MPU.

NOTE: Voltage at the 30V test pin varies with channel selection. Refer to chart for sample tuning voltages of TV/CATV(CABLE) channels as shown.

Voltage Reading Are Nominal And May Vary ± 15%

– VHF –	
Ch. 02	4.0V
Ch. 06	8.2V
Ch. 07	7.0V
Ch. 13	9.3V

– UHF –	
Ch. 14	7.7V
Ch. 69	24V

– CABLE –					
1st Band		2nd Band		3rd Band	
Ch. 1	6.7V	Ch. 16	4.5V	Ch. 47	3.7V
Ch. 15	24.7V	Ch. 46	2.70V	Ch. 94	14.9V
Ch. 95	9.8V			Ch. 100	15.1V
Ch. 99	17.5V			Ch. 125	24.0V

MICROPROCESSOR PROGRAMMING FOR BAND TUNING/SWITCHING

54MHz ◀——▶ 130MHz ◀——▶ 360MHz ◀——▶ 806MHz

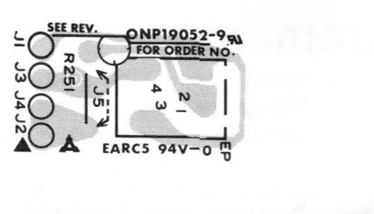
	FIRST TUNING BAND	SECOND TUNING BAND	THIRD TUNING BAND
VHF	02~06	07~13	
UHF			14~69
CABLE	01~06,14,15,95~99	07~13,16~46	47~94,100~125

NOTE: CABLE channel numbers as recommended by the joint EIA/NCTA Engineering Committee and published as EIA INTERIM STANDARD NO. 6 – CABLE TELEVISION CHANNEL IDENTIFICATION PLAN – MAY 1983.

Circuit Board Function Index (CT–1384VY)

CIRCUIT BOARDS	FUNCTION
A–BOARD	MAIN
C–BOARD	CRT
G–BOARD	A/V CONNECTORS IN–OUT
H–BOARD	S–VIDEO TERMINAL IN–OUT
J–BOARD	EARPHONE JACK (13" MODEL ONLY)
R ASSEMBLY	REMOTE RECEIVER
X–BOARD	TV/VIDEO SWITCH, S–VIDEO/VIDEO, SWITCH & COMB FILTER.

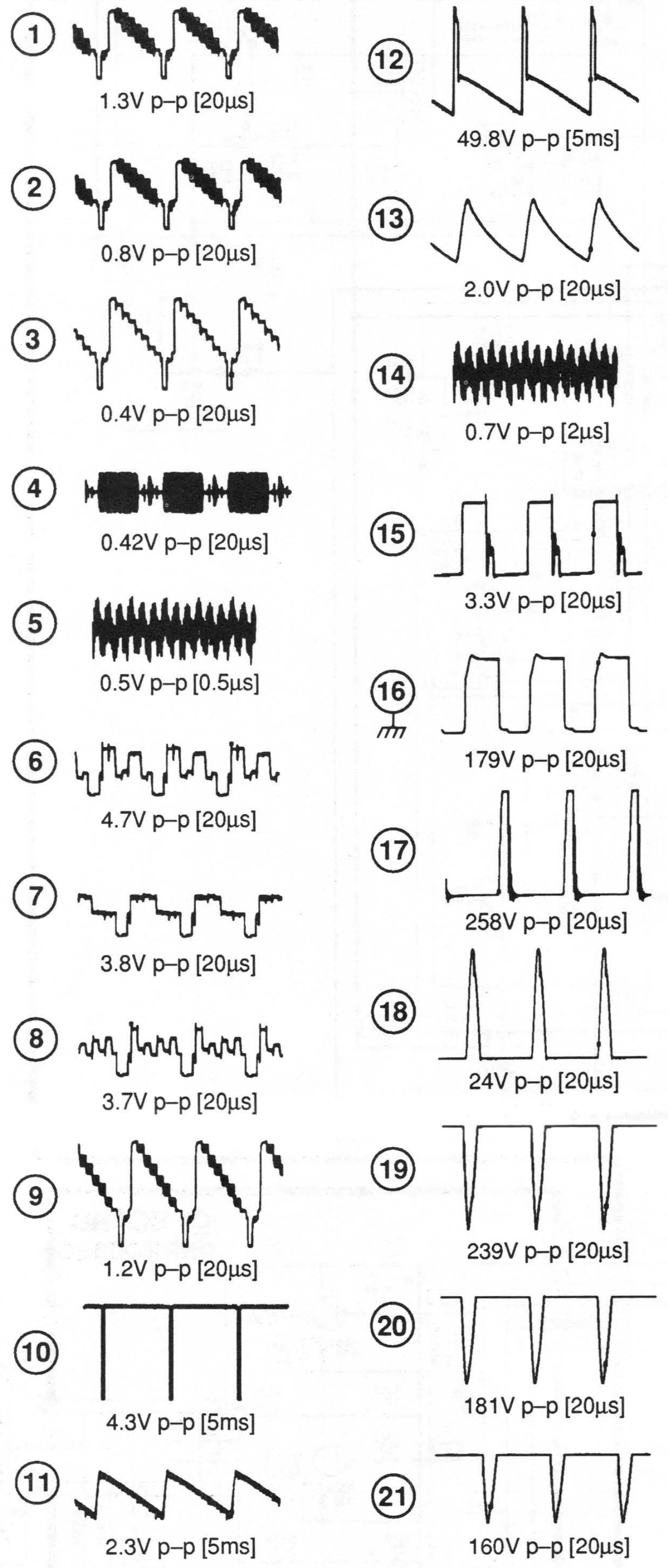
J–Board ONP19052

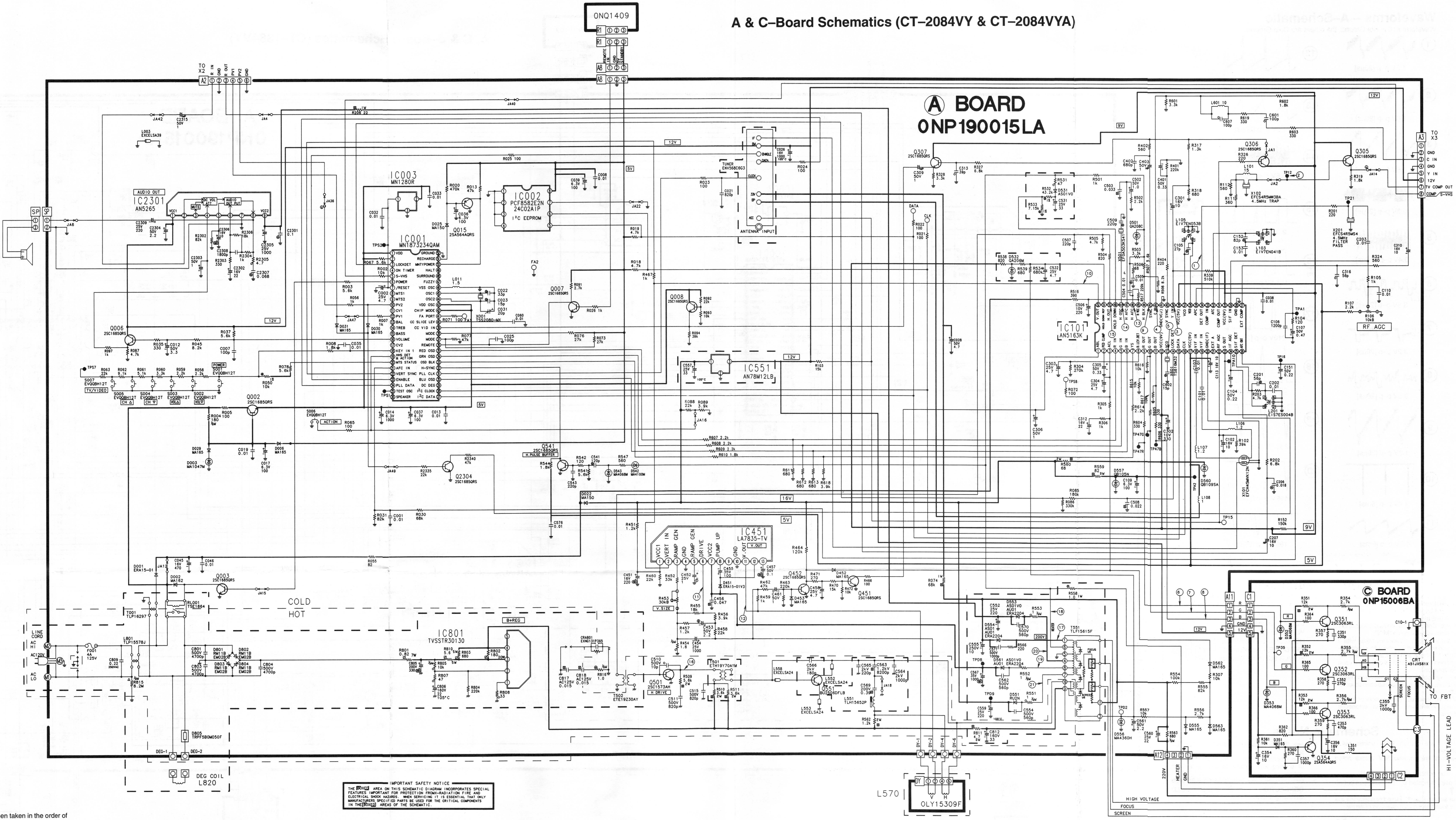


A & C–Board Schematics (CT–2084VY & CT–2084VYA)

Waveforms – A–Schematic

Waveform #16 is Hot Ground, the others are Cold Ground.





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3. All video and color waveforms taken with a wideband scope and a probe with low capacity (10 to 1). Shape and peak amplitudes may vary depending on type of Oscilloscope used and calibration.
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POWER SUPPLY – Waveform 19~21

Schematic Notes

1. Resistors are carbon 1/4W unless noted otherwise.
2. Capacitors are ceramic 50V unless noted otherwise.
3. Coil value noted is inductance in µH.
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5. When arrows [➛⬅] used connections are easily found along with direction of arrow.
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Voltage Measurements

1. Voltage measurement:
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   - Voltage readings are nominal and may vary ±10% on active devices.
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Voltage Chart – A–Board (CT–2084VY/VYA)

Integrated Circuits (ICs)

IC001

Pin	V	Pin	V
1	5.2	27	5.0
2	5.3	28	4.9
3	3.8	29	0
4	5.2	30	0
5	0	31	4.8
6	4.9	32	4.7
7	5.2	33	0
8	0	34	0
9	0	35	0
10	0	36	0
11	0	37	0
12	0	38	5.2
13	0.1	39	1.7
14	0.1	40	1.6
15	0	41	5.2
16	0.2	42	5.3
17	0	43	5.3
18	5.2	44	2.5
19	2.4	45	2.5
20	5.0	46	0
21	1.6	47	0
22	4.1	48	0
23	0.1	49	1.5
24	4.8	50	5.2
25	2.6	51	5.2
26	5.0	52	0

IC002

Pin	V
1	0
2	0
3	0
4	0
5	5.0
6	5.0
7	0
8	5.3

IC003

Pin	V
1	5.2
2	5.2
3	0

IC101

Pin	V	Pin	V
1	2.5	27	2.7
2	1.7	28	0
3	3.3	29	2.7
4	0	30	9.1
5	0	31	5.2
6	0	32	2.9
7	0	33	2.7
8	5.8	34	2.8
9	2.8	35	1.8
10	2.7	36	3.0
11	2.8	37	3.0
12	9.1	38	5.0
13	2.6	39	3.9
14	5.8	40	2.6
15	4.9	41	0
16	4.9	42	5.9
17	5.0	43	2.0
18	3.0	44	0.3
19	3.0	45	6.2
20	0	46	2.6
21	4.0	47	4.2
22	2.7	48	2.1
23	3.6	49	2.4
24	2.7	50	0.8
25	4.6	51	5.8
26	2.9	52	4.1

IC451

Pin	V
1	12.5
2	4.1
3	6.2
4	0
5	6.5
6	5.6
7	26.0
8	2.4
9	1.1
10	0
11	14.0
12	27.0
13	5.1

IC551

Pin	V
1	16.9
2	0
3	12.0

IC801 ⏚

Pin	V
1	0.2
2	130.8
3	VARIES 141.5~143.0
4	129.8
5	NC

IC2301

Pin	V
1	12.0
2	5.3
3	0
4	0.2
5	8.5
6	8.8
7	0
8	8.9
9	19.5

Transistors

Ref.	b	c	e
Q002	5.9	9.3	5.3
Q003	0.7	0	0
Q006	0.2	12.0	0.2
Q007	0.6	0.1	0
Q008	1.6	5.2	1.6
Q015	5.2	0	5.2
Q305	1.6	9.1	1.1
Q306	5.2	9.1	4.5
Q307	4.5	9.1	3.9
Q451	0	2.2	0
⏚ Q452	0.1	0	0
Q501	0	103.7	0
⏚ Q541	0	4.7	0
Q551	0	134.2	0.1
Q2304	0	2.7	0
Q3101	1.3	7.4	0.7

The Functions listed below are activated by a DC voltage change to DAC Inputs (Pin 18 and 19) of MPU IC001. Press and hold a function button on Receiver to take voltage readings.

FUNCTION	PIN 18	PIN 19
POWER	0V~0.6V	0V(Set "OFF") 0.7V~3.0V (Set "ON")
VOL ◀	0.7V~1.2V	0.7V~3.0V
VOL ▶	1.3V~1.8V	0.7V~3.0V
CH ▼	1.9V~2.4V	0.7V~3.0V
CH ▲	2.6V~3.0V	0.7V~3.0V
ACTION	4.6V~5.0V	0V~0.6V

Voltage Chart –C–Board

Transistors

Ref.	b	c	e
Q351	2.8	141.0	2.4
Q352	2.7	143.3	2.3
Q353	2.8	144.4	2.3
Q354	0.3	0	1.0

Tuner Voltage Chart

Enable, Data, and Clock have no DC readings. They are digital signals from the MPU.

NOTE: Voltage at the 30V test pin varies with channel selection. Refer to chart for sample tuning voltages of TV/CATV(CABLE) channels as shown.

Voltage Reading Are Nominal And May Vary ± 15%

– VHF –	
Ch. 02	4.0V
Ch. 06	8.2V
Ch. 07	7.0V
Ch. 13	9.3V

– UHF –	
Ch. 14	7.7V
Ch. 69	24V

– CABLE –					
1st Band		2nd Band		3rd Band	
Ch. 1	6.7V	Ch. 16	4.5V	Ch. 47	3.7V
Ch. 15	24.7V	Ch. 46	2.70V	Ch. 94	14.9V
Ch. 95	9.8V			Ch. 100	15.1V
Ch. 99	17.5V			Ch. 125	24.0V

MICROPROCESSOR PROGRAMMING FOR BAND TUNING/SWITCHING

54MHz ◀—▶ 130MHz ◀—▶ 360MHz ◀—▶ 806MHz

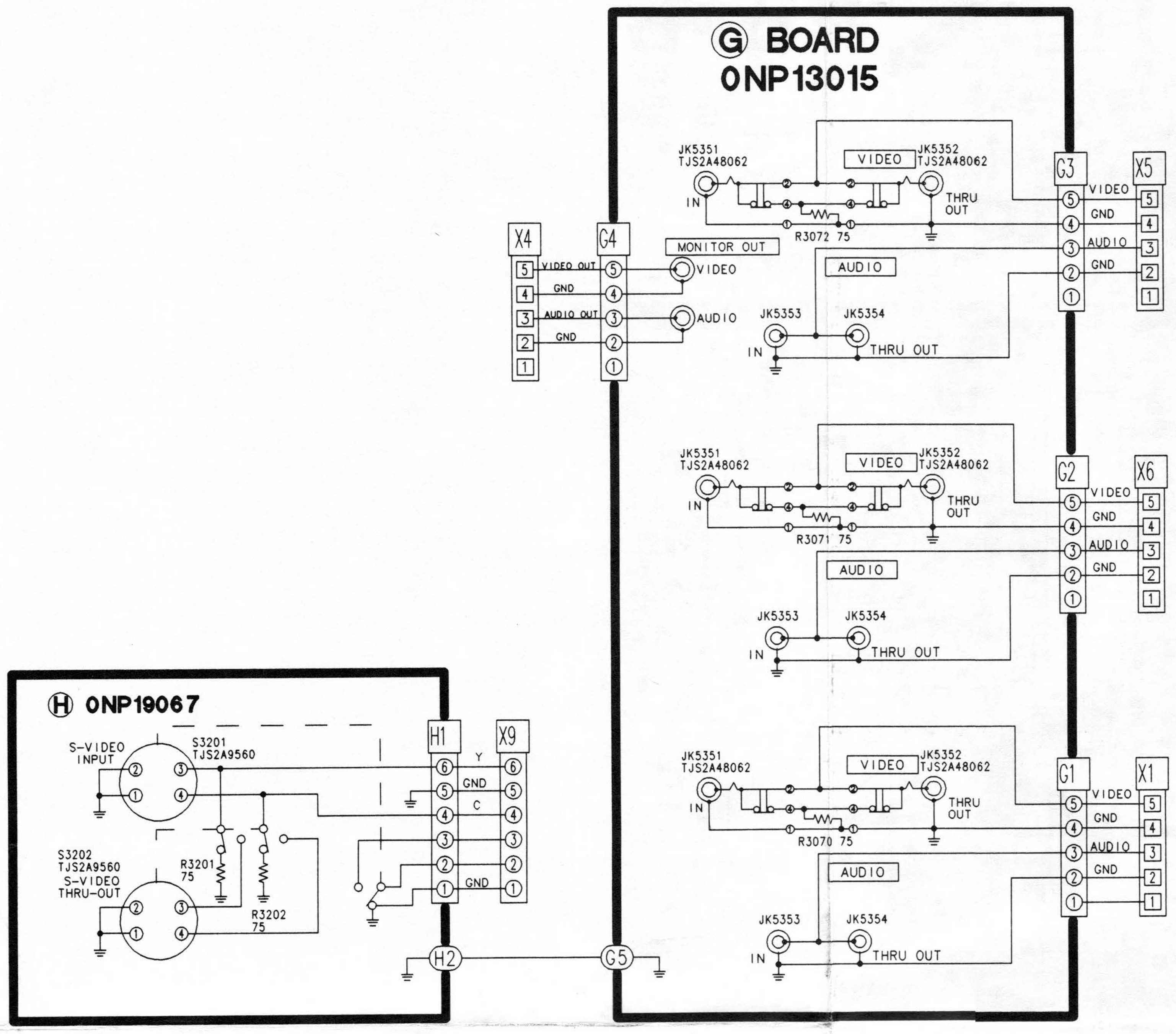
	FIRST TUNING BAND	SECOND TUNING BAND	THIRD TUNING BAND
VHF	02~06	07~13	
UHF			14~69
CABLE	01~06,14,15,95~99	07~13,16~46	47~94,100~125

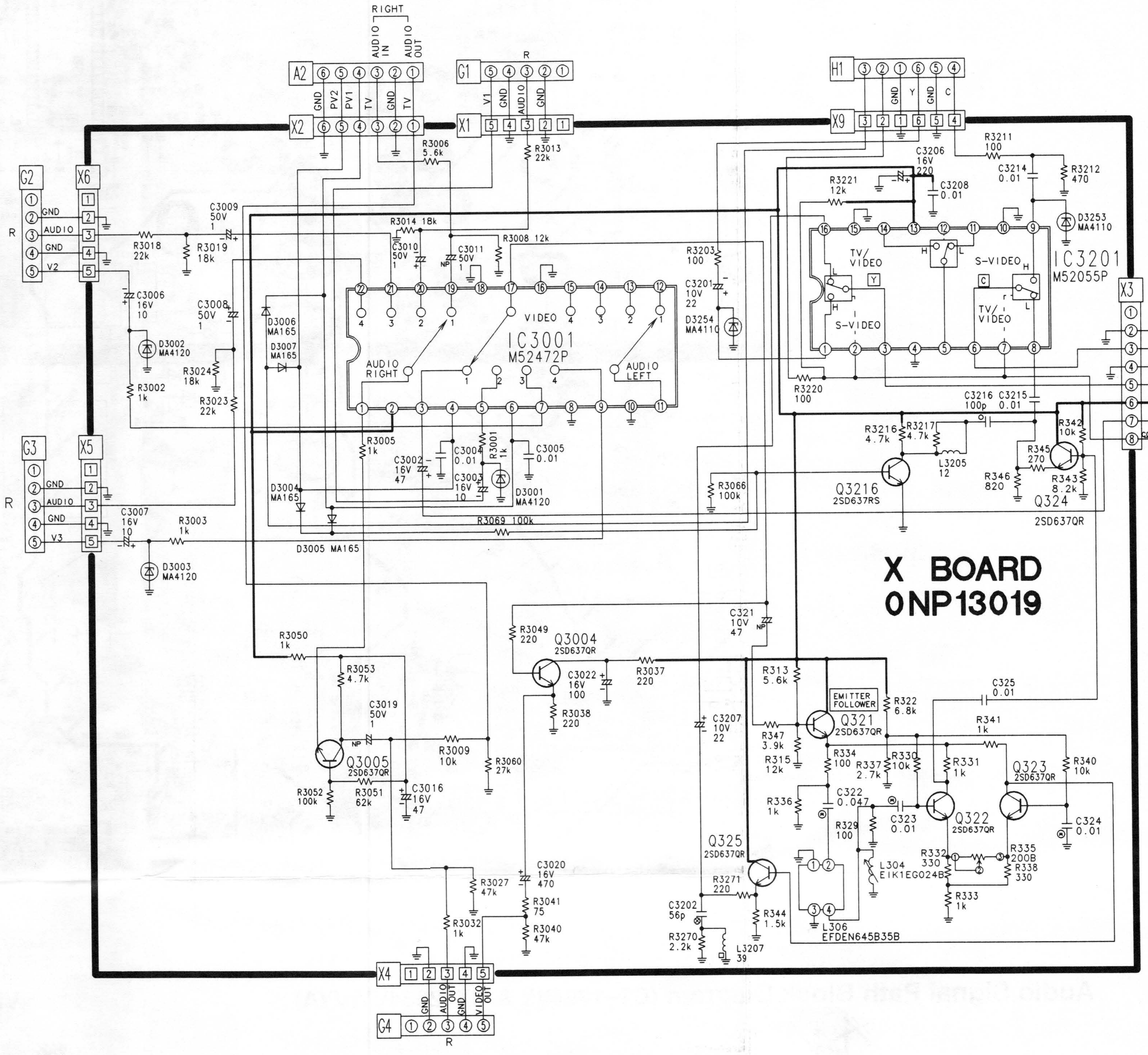
NOTE: CABLE channel numbers as recommended by the joint EIA/NCTA Engineering Committee and published as EIA INTERIM STANDARD NO. 6 – CABLE TELEVISION CHANNEL IDENTIFICATION PLAN – MAY 1983.

Circuit Board Function Index (CT–2084VY/VYA)

CIRCUIT BOARDS	FUNCTION
A–BOARD	MAIN
C–BOARD	CRT
G–BOARD	A/V CONNECTORS IN–OUT
H–BOARD	S–VIDEO TERMINAL IN–OUT
R ASSEMBLY	REMOTE RECEIVER
X–BOARD	TV/VIDEO SWITCH, S–VIDEO/VIDEO, SWITCH & COMB FILTER.

G, H & X–Board Schematics (CT–1384VY, CT–2084VY & CT–2084VYA)





Voltage Chart – X–Board (CT–1384VY & CT–2084VY/VYA)

Integrated Circuits (ICs)

IC3001

1	5.6	12	6.2
2	11.9	13	6.2
3	4.3	14	6.2
4	0	15	6.2
5	4.3	16	0
6	0.2	17	3.6
7	4.3	18	0
8	0	19	6.2
9	4.3	20	6.3
10	0	21	6.3
11	5.5	22	6.3

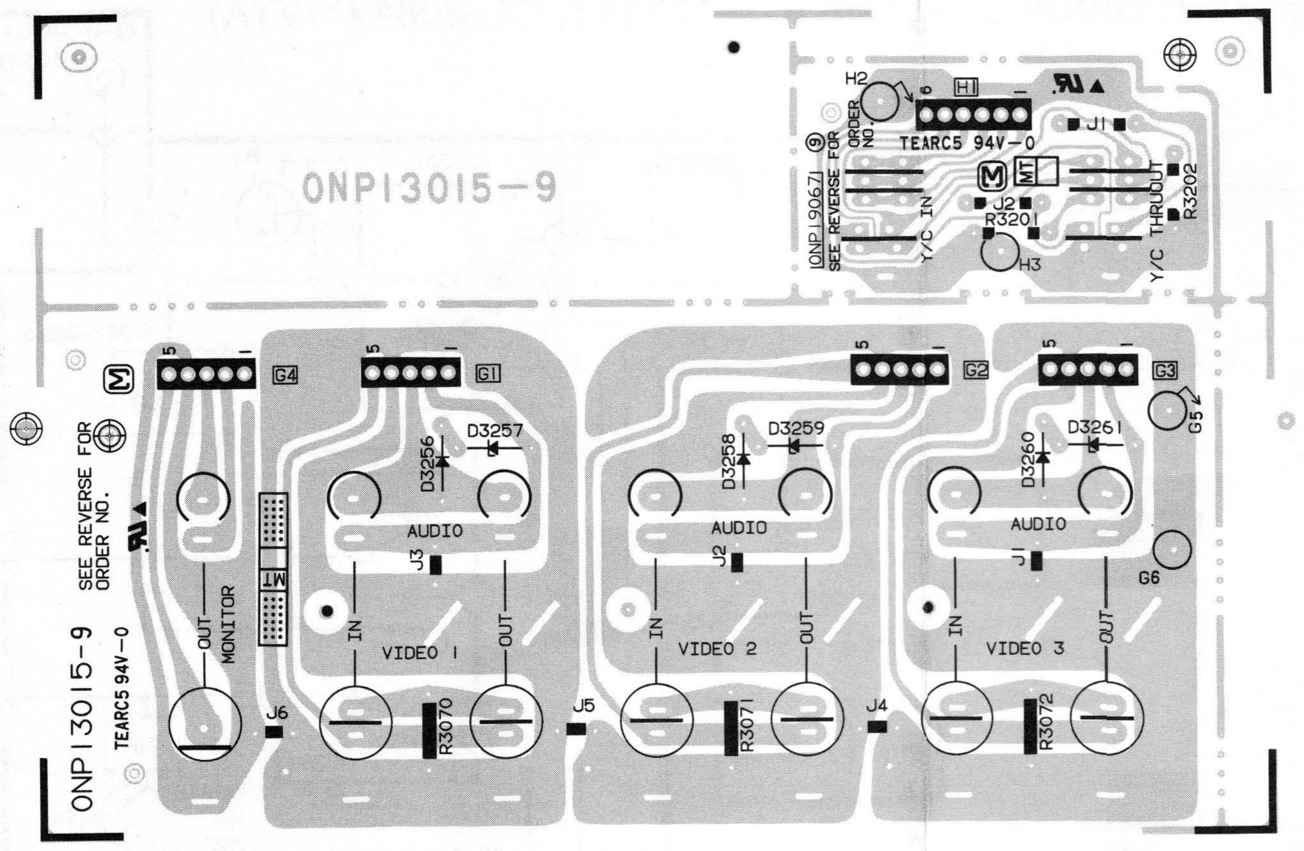
IC3201

1	5.8	9	5.8
2	0	10	0
3	4.3	11	5.8
4	0	12	0.4
5	4.4	13	11.9
6	4.4	14	5.8
7	0	15	0
8	5.8	16	5.8

Transistors

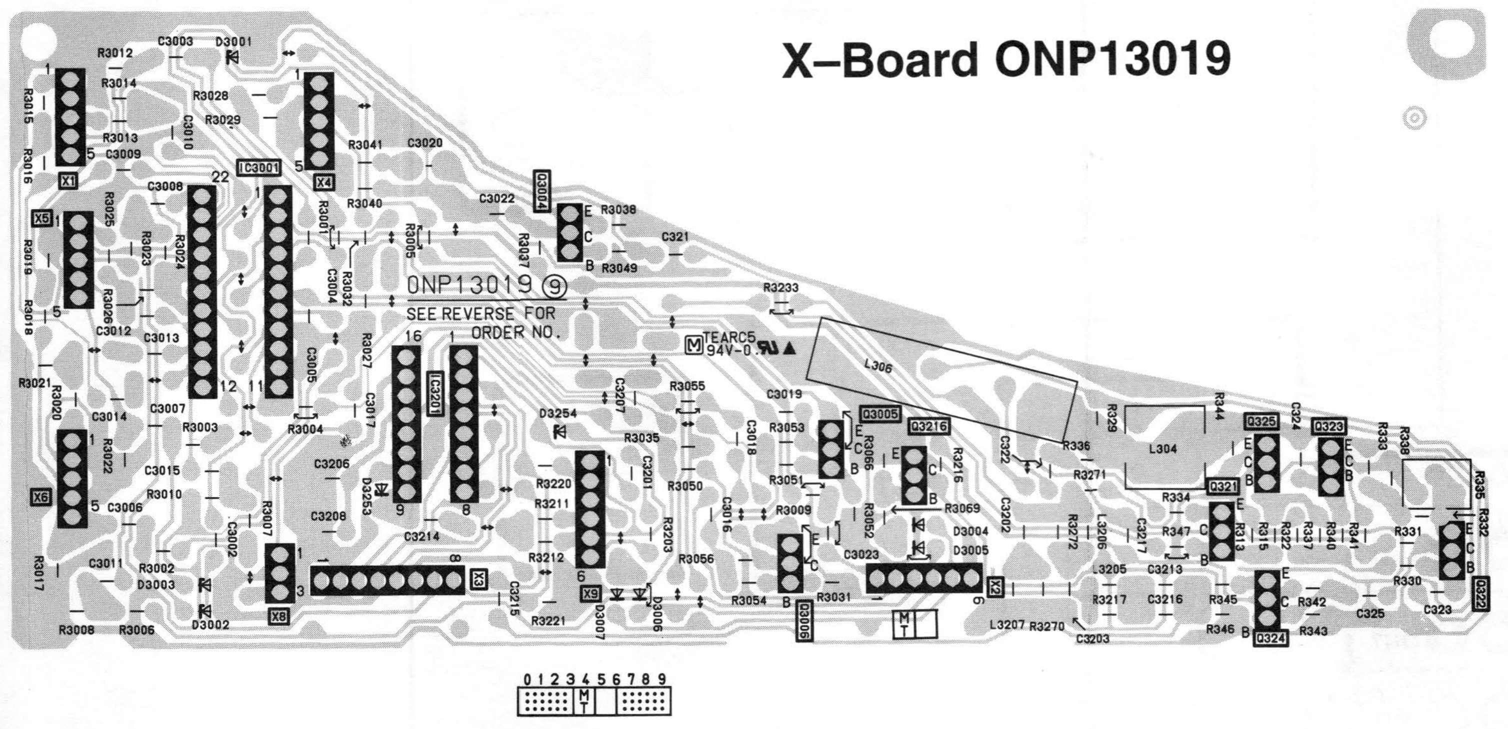
Ref. No.	b	c	e
Q321	8.8	11.9	8.1
Q322	3.3	7.0	2.6
Q323	3.3	6.9	2.6
Q324	5.2	11.9	4.6
Q325	6.9	11.9	6.2
Q3005	6.7	9.9	6.2
Q3216	0.3	11.9	0

H–Board ONP19067



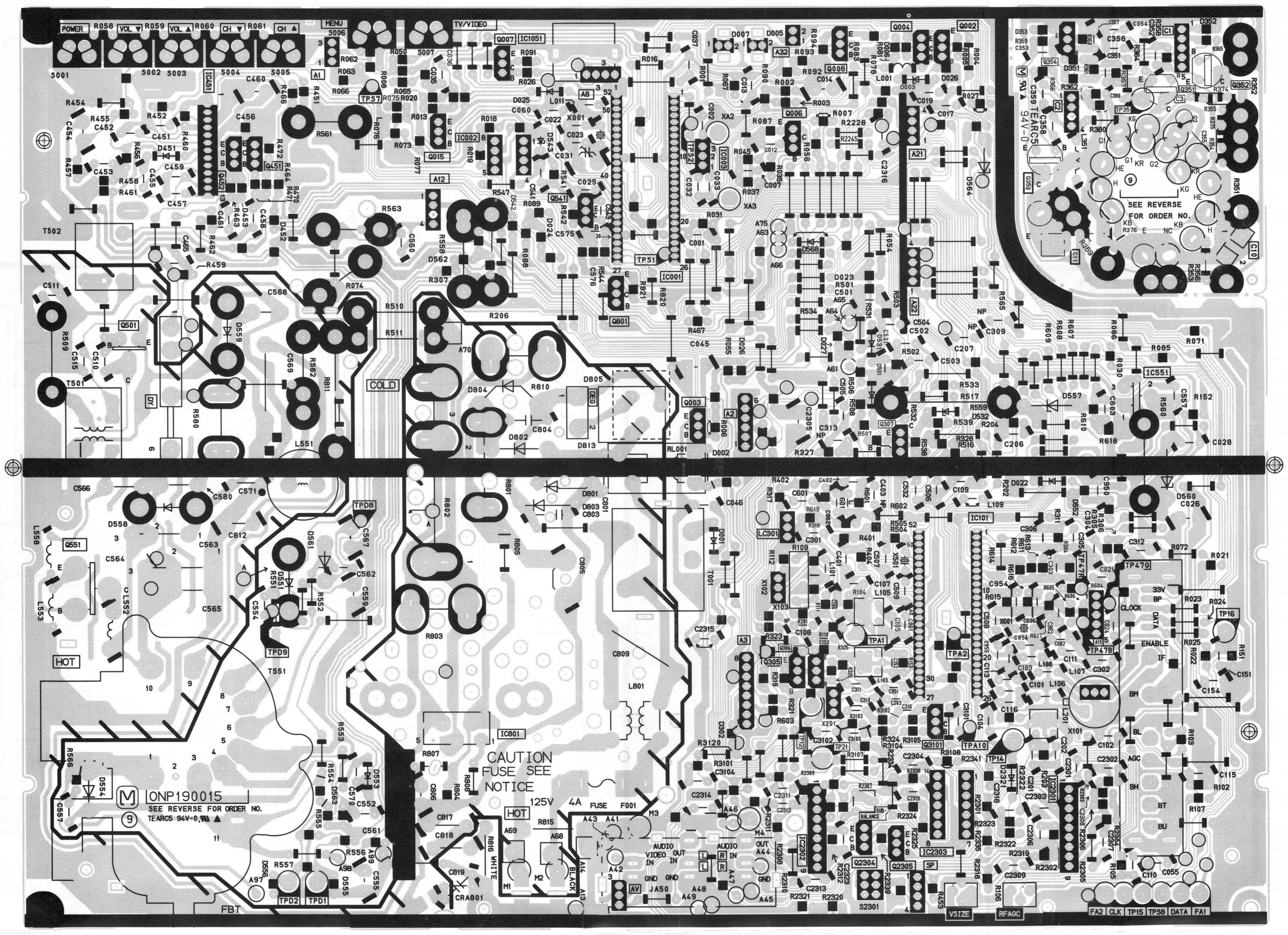
G–Board ONP13015

X–Board ONP13019

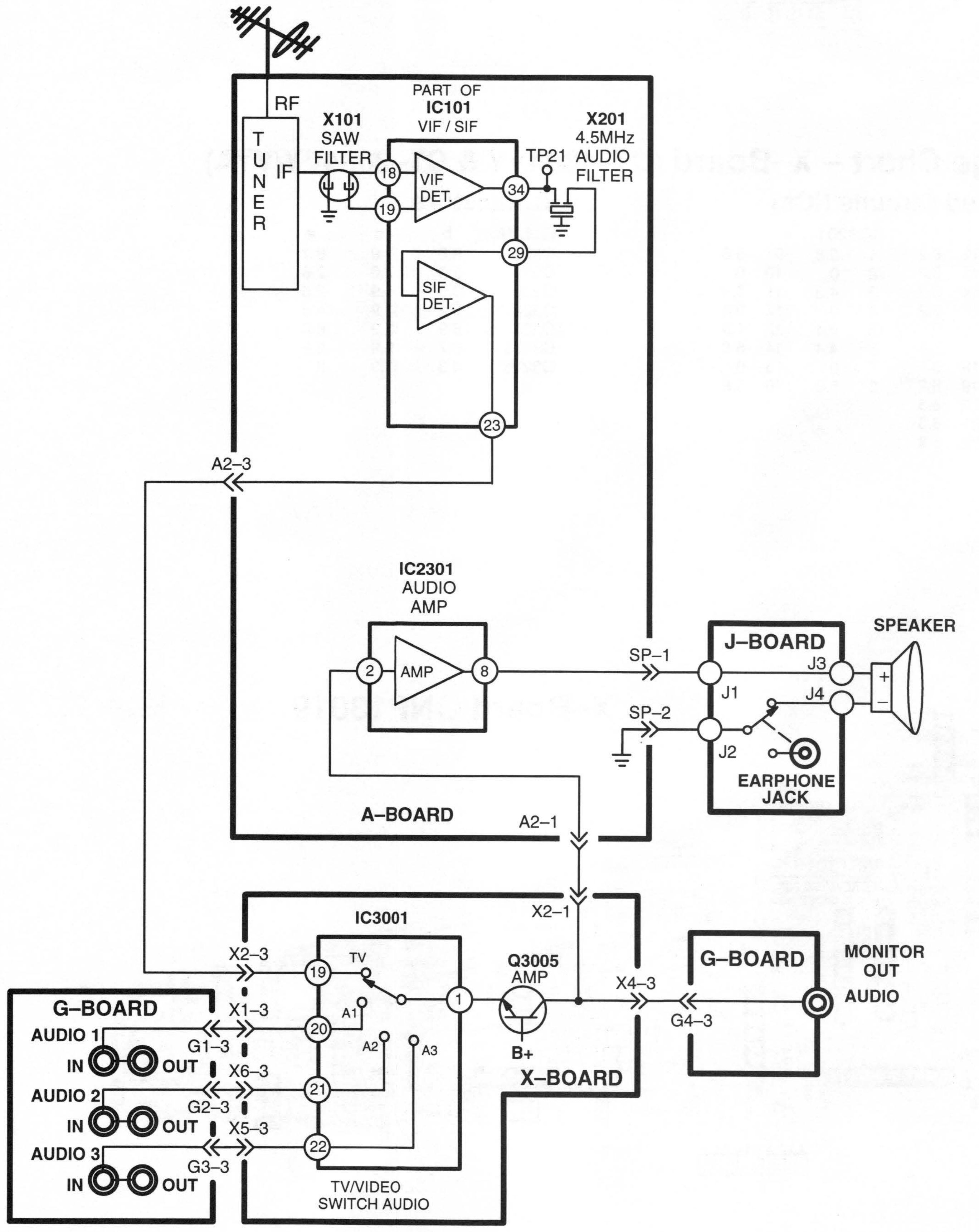


A–Board ONP190015

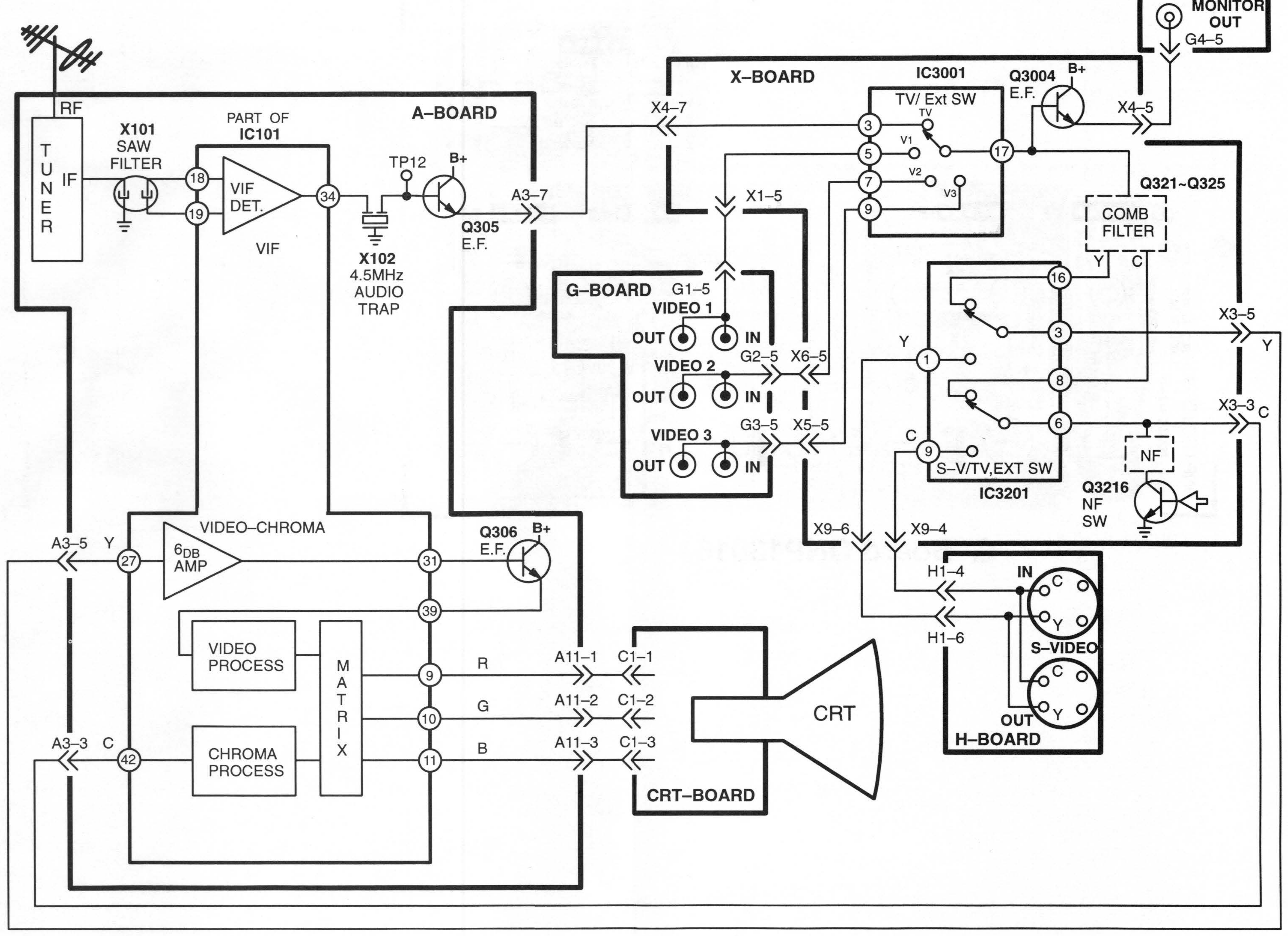
C–Board ONP15006



Audio Signal Path Block Diagram (CT–1384VY & CT–2084VY/VYA)



Video–Chroma Signal Path Block Diagram (CT–1384VY, CT–2084VY/VYA)



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